FINAL REPORT

LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS FORT LEONARD WOOD, MISSOURI

ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

Prepared for

Kansas City District Kansas City, Missouri

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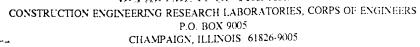
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LIST OF ABBREVIATIONS

A/C - air conditioning

AHU - air handling unit

ASHRAE - American Society for Heating, Refrigeration and Air-Conditioning

Engineers

BAW - Brad Adams Walker, Inc.

Bldg. - building

Btu - British thermal unit

COE - Corps of Engineers

DoD - Department of Defense

DPW - Directorate of Public Works

ECIP - Energy Conservation Investment Program

ECO - Energy Conservation Opportunity

EMC - EMC Engineers, Inc.

F - Fahrenheit

ft - foot, feet

FY - fiscal year

H&V - heating and ventilating

hp - horsepower

HQ - Headquarters

hr - hour

HVAC - heating, ventilating, and air conditioning

in. - inch

kW - kilowatt, one thousand watts

kWh - kilowatt-hours, one thousand watt-hours

LCCA - Life Cycle Cost Analysis

MBtu - million British thermal units

mi. - mile(s)

MZU - multizone unit

PX - Post Exchange

SIOH - supervision, inspection and overhead

SIR - Savings-to-Investment Ratio

SOW - scope of work

SPB - simple payback

sq ft - square foot, feet

SZ - single zone

UPW - Uniform Present Worth factor

VAV - variable air volume

W - Watt

yr - year(s)

EXECUTIVE SUMMARY

AUTHORIZATION FOR STUDY

This study was conducted and this report prepared under Contract No. DACA01-94-D-0033, Delivery Order No. 0009, issued to E M C Engineers, Inc. (EMC) by the U.S. Army Engineer District, Mobile, on 17 October 1995. The delivery order was managed by the Kansas City District Corps of Engineers for Fort Leonard Wood, Missouri.

PURPOSE OF STUDY

The purpose of the Limited Energy Study, Insulate Brick Buildings, is to determine the economic feasibility of installing insulation in 100 existing brick buildings in the 600, 700, 800, and 1000 areas at Fort Leonard Wood, Missouri. The existing brick wall construction has an approximate R-value of 4 which is low for this geographic location.

APPROACH

The approach taken in performing the study included the following:

- Perform a field survey to document existing conditions of the building envelope such as exterior wall construction, window types, and roof construction; document the interior equipment and objects located on or near exterior walls (because equipment and objects must be relocated before wall insulation can be installed); interview the building managers for building information, occupancy schedules, lighting schedules, and equipment schedules; and record nameplate information of existing mechanical and electrical systems.
- Collect available information and data relative to historical energy usage, current utility rate schedules, building and equipment utilization, and existing energy conservation efforts.
- Review existing building drawings, as available.
- Determine an optimum R-value for exterior walls and roofs using a life cycle cost method; calculate the life cycle cost for installing wall and roof insulation in a typical building at the Fort Leonard Wood.
- Determine the life cycle costs for two types of wall insulation using fiberglass batt insulation and rigid board insulation, and fiberglass batt roof insulation.

- From the list of 100 buildings, determine a representative building from each of the ten building types. For instance, select one representative building out of the group of Mess Hall buildings.
- Evaluate the energy savings available if insulation is installed. Calculate the energy savings using computer energy simulations for the representative buildings, and extrapolate energy savings to identical and similar buildings.
- Evaluate the implementation costs for each of the wall insulation types for each representative building, and extrapolate the implementation costs to identical and similar buildings.
- Summarize energy savings and costs for each building, ranking the buildings by Savings-to-Investment Ratio (SIR) in order of priority.
- Perform LCCAs in accordance with the Energy Conservation Investment Program (ECIP) guidance, using the calculated energy savings and implementation costs.
- Prepare a written report documenting the existing conditions, wall insulation evaluation, energy savings analyses and calculations, implementation costs, recommendations, and conclusions.

METHOD OF ANALYSIS

The method of analysis used in this study included an optimum insulation analysis, energy savings calculations, determination of construction costs, and life cycle cost analysis (LCCA). The optimum insulation analysis was initially performed to determine the optimum thicknesses of insulation for use in the energy savings calculations. The energy savings calculations and construction costs were computed for the energy conservation opportunities (ECOs) evaluated. The energy savings and construction costs were used in the LCCAs to determine the Savings-to-Investment Ratios (SIRs) and Simple Paybacks for the ECOs.

Three categories of insulation construction were evaluated for the purpose of increasing the R-value of exterior walls and roofs. The R-value is a measure of thermal resistance to heat flow through a material. Installing insulation on the exterior walls and roof will increase the total R-values, and therefore will reduce heat loss and provide energy savings. The three categories of insulation evaluated for the walls and roof are as follows:

- Fiberglass batt insulation installed on walls
- Rigid insulation installed on walls
- Fiberglass batt insulation installed on roof.

Optimum Insulation Analysis

The life cycle costs were performed to determine the optimum wall R-values and the roof R-value that would be the most cost effective at Fort Leonard Wood. A representative building (Building 625 - Battalion Headquarters) was chosen as a model building to evaluate the life cycle costs. A life cycle cost was performed for each of the three categories of insulation construction and several thicknesses of insulation within each category. Table ES-1 below summarizes the life cycle costs for these three categories.

Table ES-1. Summary of Life Cycle Costs

			Life	Cycle Co	sts (\$)		
Insulation Category	Thickne	esses of I	iberglass	Batt Ins	ulation I	nstalled o	n Walls
	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	-
Wall w/ Fiberglass Batt Insul.	53,449	64,526	61,767	62,414	69,024	70,827	-
	Th	icknesses	of Rigid	l Insulati	on Instal	led on W	alls
	0 in.	0.75 in.	1 in.	1.5 in.	2 in.	2.5 in.	3 in.
Wall w/ Rigid Insulation	53,449	59,364	59,157	59,120	59,513	60,195	60,753
	Thickn	esses of	Fiberglas	s Batt Ins	ulation I	nstalled	on Roof
	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	-
Roof w/ Fiberglass Batt Insul.	64,862	64,266	61,167	57,773	59,562	61,365	-

The lowest life cycle costs for insulation installed are the shaded items above. These life cycle costs represent the optimum thicknesses of insulation to be installed on the walls and roof. Table ES-2 below presents the optimum thicknesses of insulation.

Table ES-2. Optimum Insulation Thickness

Insulation Category	Optimum Insulation Thickness
Wall w/ Fiberglass Batt Insulation	3.5 in.
Wall w/ Rigid Insulation	1.5 in.
Roof w/ Fiberglass Batt Insulation	6.0 in.

The optimum wall insulation thicknesses are used in evaluating energy savings for the two types of wall insulation.

The roof insulation was evaluated for its optimum thickness to compare it to the existing thickness of roof insulation. The majority of the buildings have been retrofitted with 6 inches of fiberglass batt insulation, which is the optimum thickness for fiberglass batt roof insulation. Therefore, no further evaluation was performed for roof insulation.

Energy Savings Calculations

Building energy baselines were modeled on the BEACON energy analysis computer program for the ten representative buildings. The building energy baselines reflect the existing conditions of the buildings. The as-built drawings and field survey data provided the source for building inputs to the baselines.

The building energy baselines for the ten representative buildings were used to create ECO energy simulations. The energy simulation for ECO-1 is the baseline modified with the wall U-values of the additional fiberglass batt wall insulation. Similarly, the energy simulation for ECO-2 is the baseline modified with the wall U-values of the additional rigid wall insulation.

- The annual energy savings for natural gas and electricity for the representative buildings were calculated by subtracting the ECO energy use from the baseline energy use. The energy savings were then extrapolated to similar buildings by prorating the savings on a square foot basis.
- Construction costs were generated for the representative building ECOs. As-built
 drawings provided dimensions for the wall areas being renovated. Field survey data
 provided information on the quantity and type of interior equipment and objects
 required to be relocated. Costs for the renovations and relocations were obtained from
 the RS Means cost estimating guides and material manufacturers.
- The LCCAs were completed for the representative building ECOs. A 20 year economic life was used in the LCCAs. The discount factors were obtained from the Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1996 NISTIR 85-3273-10 (Rev. 10/95). The construction costs were entered into the LCCA calculation sheets.

The investment costs for the representative buildings, calculated by the LCCAs, were extrapolated to similar buildings by prorating the costs on a square foot basis.

The LCCAs also calculate SIRs and Simple Paybacks for the ECOs. The Energy Conservation Investment Program (ECIP) Guidance (dated January 1994) was used in the LCCAs. ECOs with SIRs greater than 1.25 and Simple Paybacks less than 10 years will qualify for funding. ECOs with SIRs less than 1.25 and Simple Paybacks greater than 10 years did not qualify for funding.

SUMMARY

The 100 buildings in this study were divided into ten groups on the basis of similar building use and function, with one representative building designated per group. The ten representative buildings were evaluated for two energy conservation opportunities (ECOs) each. ECO-1 represents the installation of fiberglass batt wall insulation, and ECO-2 represents the installation of rigid wall insulation. Energy savings, construction costs, and life cycle cost analyses (LCCAs) were calculated for each ECO.

The ten representative buildings are listed in Table ES-3 below.

Table ES-3. Representative Buildings for Field Survey

Bldg	Bldg	Sq	
No.	Name	Ft	Use
639	Branch PX	5,413	Retail Store
636	Brigade HQ	9,236	Administration
637	Chapel	8,949	Church and Administration
630	Mess Hall	13,280	Dining Facility
638	Administration Bldg	3,700	Administration
640	Gymnasium	20,425	Sports Facility
655	Administration/Supply	12,134	Administration and Supply
651	Barracks, with A/C	40,990	Barracks
730	Barracks, without A/C	40,640	Barracks
625	Battalion HQ	6,163	Administration

The annual energy savings for the representative buildings were extrapolated to similar buildings in each building group. The extrapolation was performed on a square foot basis. Likewise, the construction costs were extrapolated to similar buildings in each building group.

The economic summary for ECO-1 and ECO-2 is presented in Table ES-4 beginning on page ES-6. This table ranks the ECOs from highest to lowest savings-to-investment ratio (SIR). The highest SIR calculated is 0.47 with a 35.5 year Simple Payback for Building 637, a Chapel building.

RECOMMENDATIONS

The ECOs presented in Table ES-4 have SIRs less than 1.25 and Simple Paybacks greater than 10 years. These ECOs do not qualify for funding under the ECIP and, therefore, are not recommended for implementation.

TABLE ES-4

			ECC	ECONOMI	C SU	SUMMARY OF	Y OF	ECOs	- RAN	RANKED	BY SIR	æ			
č		CNC		NAT. GAS ENERGY	ELEC. ENERGY	TOTAL ENERGY	ELEC. DEMAND	NAT. GAS COST	ELEC. COST	ELEC. DEMAND COST	TOTAL ENERGY COST	TOTAL	DISCOUNTE	SIMPLE	
NO.	BLDG NAME	AREA (SF)	ECO NO.		(MBtu/yr)					(\$/yr)	(\$/yr)	T (\$)	(\$)	K (yrs)	SIR
637	Chapel	8,949	ECO 1	229.45	35.97	265.42	2.70	\$1,216	\$263	\$200	\$1,680	\$59,688	\$27,931	35.53	0.47
742	Chapel	8,949	ECO 1	229.45	35.97	265.42	2.70	\$1,216	\$263	\$200	\$1,680	\$59,688	\$27,931	35.53	0.47
843	Chapel	068'8	ECO 1	227.94	35.74	263.67	2.68	\$1,208	\$262	\$199	\$1,669	\$59,295	\$27,747	35.53	0.47
637	Chapel	8,949	EC02	232.76	37.24	270.00	2.80	\$1,234	\$273	\$208	\$1,714	\$63,708	\$28,470	37.17	0.45
742	Chapel	8,949	ECO 2	232.76	37.24	270.00	2.80	\$1,234	\$273	\$208	\$1,714	\$63,708	\$28,470	37.17	0.45
843	Chapel	8,890	ECO 2	231.23	36.99	268.22	2.78	\$1,225	\$271	\$206	\$1,703	\$63,288	\$28,282	37.17	0.45
639	Branch PX	5,413	ECO 1	49.11	8.26	57.37	1.30	\$260	\$60	\$36	\$417	\$22,547	\$6,757	54.04	0.30
835	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	\$300	\$70	\$111	\$481	\$25,992	\$7,789	54.04	0.30
835	Branch PX	6,240	ECO 2	00.09	10.27	70.27	1.50	\$318	\$75	\$111	\$504	\$28,015	\$8,183	55.54	0.29
639	Branch PX	5,413	ECO 2	52.05	8.91	96.09	1.30	\$276	\$65	96\$	\$438	\$24,302	\$7,099	55.54	0.29
930	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
632	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
653	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
E2 657	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
735	Mess Hall	13,280	EC0 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
739	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
749	Mess Hall	13,280	ECO 2	138.84	90.6	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
754	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
820	Mess Hall	13,280	EC0 2	138.84	9.08	147.92	1.50	\$736	99\$	\$111	\$914	\$55,748	\$15,485	61.02	0.28
821	Mess Hall	13,280	ECO 2	138.84	90.6	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
836	Mess Hall	13,280	EC02	138.84	90.6	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
837	Mess Hall	13,280	EC02	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
1010	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
1011	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
1027	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
630	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
632	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
653	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
657	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
735	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
739	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
749	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
754	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
820	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
821	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27

TABLE ES-4

ECONOMIC SUMMARY OF ECOS - RANKED BY SIR

			ECC	ECONOMI	c sur	SUMMARY OF	YOF	ECOs	- RAN	RANKED	BY SIR	œ			
			 _	NAT. GAS	ELEC.	TOTAL	ELEC.	NAT. GAS	ELEC.	ELEC. DEMAND	TOTAL ENERGY	TOTAL	EMICOSIG	1	
BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.					S	တ	SAVINGS (\$/yr)	SAVINGS (\$/yr)	INVESTMEN T (\$)	D SAVINGS (\$)	PAYBAC K (vrs)	SIR
ı	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
1010	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
1011	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
1027	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
744	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	\$300	\$70	\$111	\$481	\$29,219	\$7,789	60.75	0.27
744	Branch PX	6,240	EC0 2	00.09	10.27	70.27	1.50	\$318	\$75	\$111	\$504	\$30,958	\$8,183	61.38	0.26
626	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$	Ç\$	\$679	\$52,575	\$12,059	77.43	0.23
733	Administration/Supply		ECO 2	1'28.11	0.00	128.11	0.00	\$679	\$0	0\$	\$679	\$52,575	\$12,059	77.43	0.23
734	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	Ç\$	\$679	\$52,575	\$12,059	77.43	0.23
751	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$	\$679	\$52,575	\$12,059	77.43	0.23
752	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$	\$679	\$52,575	\$12,059	77.43	0.23
823	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
824	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	S S	\$679	\$52,575	\$12,059	77.43	0.23
840	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$	\$679	\$52,575	\$12,059	77.43	0.23
841	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$	\$679	\$52,575	\$12,059	77.43	0.23
1006	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	Ş	\$679	\$52,575	\$12,059	77.43	0.23
1007	Administration/Supply	12,155	ECO 2	128.11	00.0	128.11	0.00	\$679	Ç\$	\$	\$679	\$52,575	\$12,059	77.43	0.23
1025	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	Ç\$	\$679	\$52,575	\$12,059	77.43	0.23
633	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	\$678	\$0	\$0	\$678	\$52,484	\$12,038	77.43	0.23
655	Administration/Supply		ECO 2	127.89	0.00	127.89	0.00	\$678	\$0	Q\$	\$678	\$52,484	\$12,038	77.43	0.23
929	Administration/Supply	12,134	ECO 2	127.89	0.0	127.89	0.0	\$678	Ç\$	\$	\$678	\$52,484	\$12,038	77.43	0.23
929	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$	\$	\$650	\$51,082	\$11,540	78.61	0.23
733	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	Ş	\$650	\$51,082	\$11,540	78.61	0.23
734	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$	\$650	\$51,082	\$11,540	78.61	0.23
751	Administration/Supply		ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$	\$650	\$51,082	\$11,540	78.61	0.23
752	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.0	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
823	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
824	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$	Ç\$	\$650	\$51,082	\$11,540	78.61	0.23
840	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
841	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	Ç.	\$650	\$51,082	\$11,540	78.61	0.23
1006	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
1007	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	Ş	Ç\$	\$650	\$51,082	\$11,540	78.61	0.23
1025	Administration/Supply		ECO 1	122.60	0.00	122.60	0.00	\$650	\$	\$	\$650	\$51,082	\$11,540	78.61	0.23
633	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	\$649	\$0	\$0	\$649	\$50,994	\$11,520	78.61	0.23

TABLE ES-4 ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

			л П	ECONOMIC TOUR	5	SOMMARI	5		- האו	DANNED	בו אור				
				NAT GAS	<u> </u>	TOTAL	<u> </u>	NAT GAS	ELEC	ELEC. DEMAND	TOTAL		14 314		
				ENERGY		. > (Ģ	COST		TOTAL	DISCOUNTE	SIMPLE	
BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	(MBtu/yr)	SAVINGS (MBtu/yr)	_	(kW)			(\$/yr)	(\$/yr)	T (\$)	(\$)	K (yrs)	SIR
655	Administration/Supply		ECO 1	122.39		122.39	0.00	\$649	\$0	\$0	\$649	\$50,994	\$11,520	78.61	0.23
656	Administration/Supply		ECO 1	122.39	00.0	122.39	0.00	\$649	\$0	\$0	\$649	\$50,994	\$11,520	78.61	0.23
627	Barracks, with A/C	_	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
628	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
629	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
634	Barracks, with A/C	40,990	EC0 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
635	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
651	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
652	Barracks, with A/C	40,990	EC0 2	.354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
654	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
629	Barracks, with A/C	40,990	EC0 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
990	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
1012	1	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
	$\overline{}$	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1014	-	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
	T	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1016	1	40,640	EC0 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1028		40,640	EC02	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1029	T	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
627	Т	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
628	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
629	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
634	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
635	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
651	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
652	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
654	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
629	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
099	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
1012	П	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1013		40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1014		40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1015	1	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1016		40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225		\$37,576	78.69	0.21
1028	1	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
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TABLE ES-4 ECONOMIC SUMMARY OF ECOS - RANKED BY SIR

			ر ا	ECONOMIC SUMMARY OF	こっこ	MIMAR		SOOU L	- RAINED	בוב	חוט ום				
				NAT. GAS	ELEC.	TOTAL	ELEC.	NAT. GAS	ELEC.	ELEC. DEMAND	TOTAL				
2		CNIC			> 0	ENERGY	0 %		U,		COST	TOTAL	DISCOUNTE D SAVINGS	SIMPLE	
당 양	BLDG NAME	AREA (SF)	ECO NO.	(MBtu/yr)		$\overline{}$					(\$/yr)	T (\$)	(\$)		SIR
1029	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
625	1	6,163	ECO 2	70.48	7.75	78.23	00.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
631	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	00.0	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
650	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
658	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	00.00	\$374	\$57	\$	\$430	\$38,019	\$7,417	88.36	0.20
732	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
740	Battalion HQ	6,163	EC0 2	70.48	7.75	78.23	0.00	\$374	\$57	\$	\$430	\$38,019	\$7,417	88.36	0.20
750	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	00.0	\$374	\$57	œ	\$430	\$38,019	\$7,417	88.36	0.20
753	Battalion HQ	6,163	ECO 2	.70.48	7.75	78.23	00.0	\$374	\$57	\$	\$430	\$38,019	\$7,417	88.36	0.20
822	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	Q\$	\$430	\$38,019	\$7,417	88.36	0.20
825	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
838	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	00.0	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
842	1	6,163	EC0 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
		6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
-9 -9		6,163	EC02	70.48	7.75	78.23	00.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
_		6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
1023		6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
625	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	Q\$	\$411	\$37,132	\$7,091	90.30	0.19
631		6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$	\$411	\$37,132	\$7,091	90.30	0.19
650	Battation HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	Ç\$	\$411	\$37,132	\$7,091	90.30	0.19
658	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$	\$411	\$37,132	\$7,091	90.30	0.19
732	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
740	Ι	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
750		6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
753		6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
822	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
825		6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	Ç\$	\$411	\$37,132	\$7,091	90.30	0.19
838		6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	Ş	\$411	\$37,132	\$7,091	90.30	0.19
842	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	Ç\$	\$411	\$37,132	\$7,091	90.30	0.19
1008		6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$	\$411	\$37,132	\$7,091	90.30	0.19
1009	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
1022	-	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
1023	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
638		3,700	ECO 2	34.81	5.56	40.37	0.00	\$184	\$41	\$0	\$225	\$21,836	\$3,839	96.95	0.18
743	Γ	3,700	ECO 2	34.81	5.56	40.37	0.00	\$184	\$41	\$0	\$225	\$21,836	\$3,839	96.95	0.18
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BANKED RV SIB TABLE ES-4 ECONOMIC SUMMARY OF ECOS - F

E SINC	E DING				ELEC. ENERGY	TOTAL ENERGY	EC. TOTAL ELEC. NAT. GA	n 9	• "~ 7		BY SIK TOTAL ENERGY COST		DISCOUNTE	SIMPLE	į
BUILDING SAVINGS AREA (SF) ECO NO. (MBtu/yr)	SAVINGS ECO NO. (MBtu/yr)	SAVINGS (MBtu/yr)	_	SAVI		SAVINGS (MBtu/yr)	SAVINGS (kW)	SAVINGS (\$/yr)	SAVINGS (\$/yr)	SAVINGS (\$/yr)	SAVINGS (\$/yr)	Ź	D SAVINGS (\$)	PAYBAC K (yrs)	SIR
3,700 ECO 2 34.81	ECO 2 34.81	34.81	+		5.56	40.37	0.00	\$184	\$41	\$0	\$225	\$21,836	\$3,839	96.95	0.18
3,700 ECO 1 33.13	ECO 1 33.13	33.13	+	5	5.26	38.39	0.00	\$176	\$38	\$0	\$214	\$21,565	\$3,649	100.74	0.17
3,700 ECO 1 33.13	ECO 1 33.13	33.13	+	ا ای	5.26	38.39	0.00	\$176	\$38	\$0	\$214	\$21,565	\$3,649	100.74	0.17
3,700 ECO 1 33.13	3,700 ECO 1 33.13	33.13	+	2	5.26	38.39	0.0	\$176	\$38	\$	\$214	\$21,565	\$3,649	100.74	0.17
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	4	9	00.0	278.90	0.00	\$1,478	QŞ	Ş	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+	익	0.00	278.90	0.00	\$1,478	Q\$	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+		00.0	278.90	000	\$1,478	Ç,	\$	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 2/8.90	40,640 ECO 2 2/8.90	2/8.90	+	۱ [۲	000	2/8.90	0.00	\$1,478	S S	တ္တ	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECU 2 · 2/8.90	40,640 ECU 2 · 2/8.90	278.90	+	이	00.0	278.90	0.00	\$1,478	\$	Ş	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	4		0.00	278.90	0.00	\$1,478	Ç\$	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	\perp	이	0.0	278.90	000	\$1,478	\$	\$	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+	0	0.00	278.90	0.0	\$1,478	O\$	Ş,	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+	0	0.00	278.90	0.00	\$1,478	\$	\$	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+	9	000	278.90	0.00	\$1,478	\$	\$	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+	0	0.0	278.90	0.00	\$1,478	\$	OŞ.	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+		0.0	278.90	0.00	\$1,478	\$	Q\$	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+		0.00	278.90	0.0	\$1,478	Q\$	\$	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	-	이	0.0	278.90	00.0	\$1,478	န	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	+	0	000	278.90	0.00	\$1,478	\$	Ş	\$1,478	\$183,884	\$26,252	124.40	0.14
278.90	40,640 ECO 2 2/8.90	278.90	+	9	00.0	278.90	00:0	\$1,478	OŞ.	င္တ	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 2 278.90	40,640 ECO 2 278.90	278.90	\perp	7	8 8	278.90	0.00	\$1,478	es :	Q :	\$1,478	\$183,884	\$26,252	124.40	0.14
40 640 FCO 2 278 90	40 640 FCO 2 278 90	278 90	\downarrow	7	3 6	070 070	3.6	0 14/0	2	Q (\$1,478	\$183,884	\$26,252	124.40	0.14
40 640 FCO 278 90	40 640 FCO 278 90	278 90	╀	,	3 8	070 070	3 6	914/0	2	9 8	\$1,478	\$183,884	\$26,252	124.40	0.14
40.640 ECO 1 26173	40.640 ECO 1 26173	261.73	╀	-	000	261 73	8 6	41 287	2	2 6	\$1,478	\$183,884	\$26,252	124.40	0.14
40,640 ECO 1 261.73	40,640 ECO 1 261.73	261.73		-	000	26173	000	\$1387	3 5	\$	44 207	4170,277	\$24,636	128.73	0.14
40,640 ECO 1 261.73	40,640 ECO 1 261.73	261.73	_	0	00.0	261.73	000	\$1387	Ş	\$ \$	44 207	0470 777	\$24,030	128./3	0.14
40.640 ECO 1 26173	40.640 ECO 1 26173	26173	L	ō	000	261 73	200	41 207	3 6	9 6	4 1,007	1/0'0/10	\$24,636	128./3	0.14
40 640 FCO 1 261 72	40 640 FCO 1 261 72	261.73	+	ò	2 2	264.70	3 8	1,00,10	2 8	2	41,387	\$178,577	\$24,636	128.73	0.14
10,040	10,040	501.73	+	3 }	2	201./3	0.00	\$1,387	Q\$	8	\$1,387	\$178,577	\$24,636	128.73	0.14
40,640 ECO 1 261.73	40,640 ECO 1 261.73	261.73	+	ŏ		261.73	80.0	\$1,387	Ş	\$	\$1,387	\$178,577	\$24,636	128.73	0.14
40,640 ECO 1 261.73	40,640 ECO 1 261.73	261.73	+		0.00	261.73	0.00	\$1,387	\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
40,640 ECO 1 261.73	40,640 ECO 1 261.73	261.73	4	-	00.0	261.73	0.0	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
40,640 ECO 1	40,640 ECO 1	\dashv	261.73	- 1	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24.636	128.73	0 14
40,640 ECO 1 261.73	40,640 ECO 1 261.73	261.73	+	1	0.00	261.73	0.00	\$1,387	\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
Barracks, without A/Q 40,640 ECO 1 261.73 0.	40,640 ECO 1 261.73	1 261.73	4	0	00.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14

TABLE ES-1 ECONOMIC SUMMARY OF FOR

			EC	ECONOMI	S SUI	C SUMMARY OF ECOS	Y OF		- RANKED		BY SIR	<u> </u>			
	*			NAT. GAS ENERGY	ELEC. ENERGY	TOTAL	ELEC. DEMAND	NAT. GAS	ELEC.	ELEC. DEMAND	TOTAL ENERGY	TOTAL	DISCOUNTE	J IQNIO	
BLD	BLDG BIDG NAME	BUILDING AREA (SE)	ECO NO		SAVINGS			ŝ	Si	ŝ	S	INVESTMEN	D SAVINGS	PAYBAC	
8	Bar		ECO 1	1	00.0	261.73	0.00	\$1,387	\$	\$	\$1387	\$178.577	\$24 636	128 73	1 C
817	17 Barracks, without A/C	'd 40,640	ECO 1	261.73	00.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24.636	128.73	0.14
818	18 Barracks, without A/C	'C 40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
819	19 Barracks, without A/C	d 40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
827	27 Barracks, without A/C	Q 40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
8	828 Barracks, without A/C	0 40,640	ECO 1	261.73	000	261.73	0.00	\$1,387	Q\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
8	829 Barracks, without A/C	0 40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
830	30 Barracks, without A/C	0 40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
831	31 Barracks, without A/C	0 40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
640	40 Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	\$850	\$0	\$0	\$850	\$129,351	\$15,092	152.22	0.12
74	746 Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	\$850	\$0	\$	\$850	\$129,351	\$15,092	152.22	0.12
826	26 Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	\$850	\$	\$0	\$850	\$129,351	\$15,092	152.22	0.12
640	to Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	\$885	\$	\$0	\$885	\$139,097	\$15,717	157.18	0.11
:S-	746 Gymnasium	20,425	ECO 2	166.97	0.00	166.97	0.00	\$885	\$0	\$0	\$885	\$139,097	\$15,717	157.18	0.11
928 11	П	20,425	ECO 2	166.97	0.00	166.97	0.00	\$885	\$0	\$0	\$885	\$139,097	\$15,717	157.18	0.11
844	14 Brigade HQ	9,890	ECO 1	45.94	12.32	58.25	0.86	\$243	\$30	\$64	\$397	\$61,881	\$6,425	155.79	0.10
2	1018 Brigade HO	9,890	ECO 1	45.94	12.32	58.25	98.0	\$243	\$30	\$64	\$397	\$61,881	\$6,425	155.79	0.10
989	36 Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	0.80	\$227	\$84	\$29	\$371	\$57,789	\$6,000	155.79	0.10
741	11 Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	0.80	\$227	\$84	\$59	\$371	\$57,789	\$6,000	155.79	0.10
844	14 Brigade HQ	9,890	EC0 2	48.27	12.83	61.10	0.86	\$256	\$94	\$64	\$413	\$65,384	\$6,696	158.19	0.10
1018	18 Brigade HQ	9,890	ECO 2	48.27	12.83	61.10	0.86	\$256	\$94	\$64	\$413	\$65,384	\$6,696	158.19	0.10
929		9,236	ECO 2	45.08	11.98	57.06	0.80	\$239	\$88	\$59	\$386	\$61,061	\$6,253	158.19	0.10
741	 Brigade HQ 	9,236	ECO 2	45.08	11.98	57.06	0.80	\$239	\$88	\$59	\$386	\$61,061	\$6,253	158.19	0.10

ES-11

1. INTRODUCTION

1.1 AUTHORITY FOR STUDY

This study was conducted and this report prepared under Contract No. DACA01-94-D-0033, Delivery Order No. 0009, issued to E M C Engineers, Inc. (EMC) by the U.S. Army Engineers District, Mobile, on 17 October 1995. The delivery order was managed by the Kansas City District Corps of Engineers for Fort Leonard Wood, Missouri.

1.2 PURPOSE OF STUDY

The purpose of the Limited Energy Study, Insulate Brick Buildings, is to determine the economic feasibility of installing insulation in 100 existing brick buildings in the 600, 700, 800, and 1000 areas at Fort Leonard Wood, Missouri. The existing brick wall construction has an approximate R-value of 4 which is low for this geographic location.

1.3 SCOPE OF WORK

The Scope of Work for this study is presented in Appendix A. The requirements outlined in the Scope of Work are summarized as follows:

- Perform a limited site survey of specific buildings or areas to collect data required to evaluate the specific energy conservation opportunities (ECOs) included in this study.
- Evaluate specific ECOs to determine their energy savings potential and economic feasibility.
- Provide project documentation for recommended ECOs.
- Prepare a comprehensive report to document work performed, the results, and recommendations.

1.4 APPROACH

The approach taken in performing the study included the following:

 Perform a field survey to document existing conditions of the building envelope such as exterior wall construction, window types, and roof construction; document the interior equipment and objects located on or near exterior walls; interview the building managers for building information, occupancy schedules, lighting schedules, and equipment schedules; and record nameplate information of existing mechanical and electrical systems.

- Collect available information and data relative to historical energy usage, current utility rate schedules, building and equipment utilization, and existing energy conservation efforts.
- Review existing building drawings, as available.
- Determine an optimum R-value for exterior walls using a life cycle cost method; calculate the life cycle cost for installing wall and roof insulation in a typical building at the Fort Leonard Wood.
- Determine the life cycle costs for two types of wall insulation: fiberglass batt insulation and rigid board insulation, and for fiberglass batt roof insulation.
- From the list of 100 buildings, determine a representative building from each of the ten building types. For instance, select one representative building out of the group of Mess Hall buildings.
- Evaluate the energy savings available if insulation is installed. Calculate the energy savings using computer energy simulations for the representative buildings, and extrapolate energy savings to identical and similar buildings.
- Evaluate the implementation costs for each of the wall insulation types for each representative building, and extrapolate the implementation costs to identical and similar buildings.
- Summarize energy savings and costs for each building, ranking the buildings by Savings-to-Investment Ratio (SIR) in order of priority.
- Perform LCCAs in accordance with the Energy Conservation Investment Program (ECIP) guidance, using the calculated energy savings and implementation costs.
- Prepare a written report documenting the existing conditions, wall insulation evaluation, energy savings analyses and calculations, implementation costs, recommendations, and conclusions.

A total of 100 buildings were included in this study to determine the economic benefits of installing insulation. These buildings are listed in Table 1-1 on the following page in ascending order by building number.

Table 1-1. Buildings Evaluated for Insulation

	1	
Bldg. No.	Building Name	Bldg. Area
140.		(sq ft)
625	Battalion HQ	6,163
626	Administration/ Supply	12,155
627	Barracks, with A/C	40,640
628	Barracks, with A/C	40,640
629	Barracks, with A/C	40,640
630	Mess Hall	13,280
631	Battalion HQ	6,163
632	Mess Hall	13,280
633	Administration/ Supply	12,134
634	Barracks, with A/C	40,990
635	Barracks, with A/C	40,990
636	Brigade HQ	9,236
637	Chapel	8,949
638	Administration Bldg	3,700
639	Branch PX	5,413
640	Gymnasium	20,425
650	Battalion HQ	6,163
651	Barracks, with A/C	40,990
652	Barracks, with A/C	40,990
653	Mess Hall	13,280
654	Barracks, with A/C	40,990
655	Administration/ Supply	12,134
656	Administration/ Supply	12,134
657	Mess Hall	13,280
658	Battalion HQ	6,163
659	Barracks, with A/C	40,990
660	Barracks, with A/C	40,990
730	Barracks, without A/C	40,640
731	Barracks, without	40,640
732	A/C Battalion HQ	6,163
733	Administration/ Supply	12,155
734	Administration/ Supply	12,155
735	Mess Hall	13,280
736	Barracks, without A/C	40,640
737	Barracks, without A/C	40,640

Bldg. No.	Building Name	Bldg. Area
140.		(sq ft)
738	Barracks, without	40,640
700	A/C	20,010
739	Mess Hall	13,280
740	Battalion HQ	6,163
741	Brigade HQ	9,236
742	Chapel	8,949
743	Administration Bldg	3,700
744	Branch PX	6,240
746	Gymnasium	20,425
747	Barracks, without A/C	40,640
748	Barracks, without A/C	40,640
749	Mess Hall	13,280
<i>7</i> 50	Battalion HQ	6,163
<i>7</i> 51	Administration/ Supply	12,155
<i>7</i> 52	Administration/ Supply	12,155
<i>7</i> 53	Battalion HQ	6,163
754	Mess Hall	13,280
7 55	Barracks, without A/C	40,640
756	Barracks, without A/C	40,640
757	Barracks, without A/C	40,640
815	Barracks, without A/C	40,640
816	Barracks, without A/C	40,640
817	Barracks, without A/C	40,640
818	Barracks, without A/C	40,640
819	Barracks, wothout A/C	40,640
820	Mess Hall	13,280
821	Mess Hall	13,280
822	Battalion HQ	6,163
823	Administration/ Supply	12,155
824	Administration/ Supply	12,155
825	Battalion HQ	6,163
826	Gymnasium	20,425
827	Barracks, without A/C	40,640

Bldg. No.	Building Name	Bldg. Area
110.		(sq ft)
828	Barracks, without	40,640
	A/C	
829	Barracks, without A/C	40,640
830	Barracks, without A/C	40,640
831	Barracks, without A/C	40,640
832	Administration Bldg	3,700
835	Branch PX	6,240
836	Mess Hall	13,280
837	Mess Hall	13,280
838	Battalion HQ	6,163
840	Administration/ Supply	12,154
841	Administration/ Supply	12,155
842	Battalion HQ	6,163
843	Chapel	8,890
844	Brigade HQ	9,890
1006	Administration/ Supply	12,155
1007	Administration/ Supply	12,155
1008	Battalion HQ	6,163
1009	Battalion HQ	6,163
1010	Mess Hall	13,280
1011	Mess Hall	13,280
1012	Barracks, with A/C	40,640
1013	Barracks, with A/C	40,640
1014	Barracks, with A/C	40,640
1015	Barracks, with A/C	40,640
1016	Barracks, with A/C	40,640
1018	Brigade HQ	9,890
1022	Battalion HQ	6,163
1023	Battalion HQ	6,163
1025	Administration/ Supply	12,155
1026	Branch PX	8,533
1027	Mess Hall	13,280
1028	Barracks, with A/C	40,640
1029	Barracks, with A/C	40,640

Building 1026, a Branch PX, was built in 1985. It was determined during the course of the analysis that the insulation for the walls and roof for this new building well exceed the optimum thicknesses for insulation. Thus, it was eliminated from the energy savings analysis.

1.5 ORGANIZATION OF REPORT

The narrative of this report has been organized in the following manner:

- Section 2 presents facility data for the different types of buildings in this study.
- Section 3 summarizes the field survey data collected and used for the analysis.
- Section 4 describes the methodology used to perform the energy savings analysis.
- Section 5 presents a detailed description of the representative buildings and the results of the ECO-1 and ECO-2 analyses for each building type.
- Section 6 summarizes the energy savings and economics for the ECOs and provides recommendations for ECOs.

2. FACILITY DATA

2.1 GENERAL

Several types of buildings are evaluated in this study. The building use types include Branch PXs, Brigade Headquarters, Chapels, Mess Halls, Administration, Gymnasiums, Administration-Supply, Barracks, and Battalion Headquarters. The energy sources for these buildings include two fuel types, electricity and natural gas.

2.2 ENERGY SOURCES AND CONSUMPTION

2.2.1 Electricity

The electrical energy use at Fort Leonard Wood is metered at four substations, #1, #2, #3, and #5. Historical electrical energy use and cost data were obtained from billing records at Fort Leonard Wood. The electrical power is provided by the SHO-ME POWER Electric Cooperative utility company.

Table 2-1 below presents the historical data for electrical energy consumption metered at Substations #1, #2, #3, and #5 for the month of September 1995. The electrical energy unit cost is \$0.025 per kWh or \$7.325 per MBtu.

Table 2-1. Historical Data for Electrical Consumption

Substation No.	Electrical Consumption (kWh)	Electrical Cost (\$)	
Substation #1	4,219,318	105,482.95	
Substation #2	3,685,346	92,133.65	
Substation #3	2,658,102	66,452.55	
Substation #5	584,217	14,605.43	
Totals	11,146,983	278,674.58	
Electri	cal Energy Unit Costs	\$0.025 / kWh \$7.325 / MBtu	

The electrical demand is metered simultaneously for Substations #1, #2, #3, and #5. The total electrical demand for the substations is 26,248 kW. The electrical demand charge is computed using the average billing demand. The current average billing demand, in effect through December 1995, is from the 36 month period ending August 1994. For the month

of September 1995, the average billing demand is 30,524 kW and the electrical demand billing is \$188,790.94. The electrical demand unit cost is \$6.185/kW.

2.2.2 Natural Gas

Historical data for natural gas consumption was obtained from billing records at Fort Leonard Wood. Table 2-2 below presents the natural gas consumption and cost data beginning with FY93. The natural gas consumption and cost data from FY96 through FY02 is estimated, and is included at the request of the Directorate of Public Works (DPW) Energy. The calculated unit cost provided by DPW for natural gas is also presented.

Table 2-2. Historical Data for Natural Gas Consumption

Fiscal Year	Natural Gas Consumption (MBtu)	Annual Natural Gas Fixed Cost	Annual Natural Gas Variable Cost	Total Annual Natural Gas Cost	Natural Gas Unit Cost
FY 93	371,215	\$2,144,931	\$2.4885	\$3,068,681	\$8.27
FY 94	600,783	\$2,190,988	\$2.4683	\$3,673,871	\$6.12
FY 95	617,335	\$2,114,395	\$1.9099	\$3,293,422	\$5.33
FY 96	625,000	\$2,089,752	\$1.8099	\$3,220,937	\$5.15
FY 97	625,000	\$2,005,752	\$1.8299	\$3,149,444	\$5.04
FY 98	625,000	\$1,795,752	\$1.8312	\$2,940,259	\$4.70
FY 99	625,000	\$1,753,752	\$1.8524	\$2,911,515	\$4.66
FY 00	625,000	\$1,711,752	\$1.8742	\$2,883,156	\$4.61
FY 01	625,000	\$1,699,752	\$1.8871	\$2,849,160	\$4.56
FY 02	625,000	\$1,627,752	\$1.9102	\$2,821,596	\$4.51
				Unit Cost of Nat. Gas	\$5.30 per MBtu

3. FIELD SURVEY

3.1 GENERAL

A field survey was performed for the purpose of evaluating insulation in 100 brick buildings at Fort Leonard Wood. A detailed field survey was conducted on ten representative buildings to obtain information on the existing condition of the building envelopes, mechanical systems, electrical systems, and interior walls and equipment. A walk-through of the remaining ninety buildings was completed to document whether they were identical or similar to the representative buildings for the purpose of extrapolating the energy savings and investment costs.

The ten representative buildings are listed in Table 3-1 below.

Bldg Bldg Sq No. Name Ft Use Branch PX Retail Store 639 5,413 9,236 Administration 636 Brigade HQ 637 8,949 Church and Administration Chapel Mess Hall 13,280 Dining Facility 630 638 Administration Bldg 3,700 Administration 20,425 640 Gymnasium Sports Facility Administration and Supply 655 Administration/Supply 12,134 Barracks, with A/C 40,990 651 **Barracks** 730 Barracks, without A/C 40,640 **Barracks**

6,163

Administration

Table 3-1. Representative Buildings for Field Survey

The existing conditions and information about the following building components were documented during the field survey:

Exterior wall construction

Battalion HQ

- Window glazing types
- Roof construction

625

- Interior wall construction
- Interior structures, equipment, and fixtures on or adjacent to the exterior walls
- Process equipment that produce internal gains.
- Heating ventilating and air conditioning (HVAC) equipment nameplate information

- HVAC controls
- Electrical systems

The building managers were interviewed to obtain building information, occupancy schedules, lighting schedules, and equipment schedules. The field survey forms documenting the existing conditions and building information are presented in Appendix D.

The field survey also included obtaining as-built drawings and collecting available data relative to historical energy usage, current utility rate schedules, and existing energy conservation efforts.

The field survey for wall insulation was directed toward the interior surfaces of the perimeter walls. Discussions with the Directorate of Public Works revealed that the exterior of the brick buildings should remain brick in appearance. The building's external appearance is subject to Department of Defense (DOD) codes for esthetics; the established external appearance for buildings in the 600, 700, 800, and 1000 areas is brick.

The installation of wall insulation on the building exterior would require a brick exterior appearance to match the existing buildings. Installing a new brick exterior wall over insulation was cost prohibitive. Exterior Insulation and Finish Systems (EIFSs) were considered for exterior wall insulation at a lower cost than a new brick exterior wall. However, the durability of EIFSs for a long-lasting exterior wall is questionable, as the EIFSs can be damaged by pushing or kicking inward. Therefore, the decision was made to only evaluate insulation installed on interior surfaces.

Additionally, the existing brick and concrete walls are constructed to allow water drainage from the wall air space through weep holes. If the exterior wall is covered over with an insulation system, and if water or moisture leaks into the wall air space, the weep holes would be sealed over with the moisture trapped inside the wall. The moisture build-up inside the brick and concrete walls could lead to deterioration of the walls. Discussion is included at the end of Appendix A.

3.2 OVERVIEW OF FIELD SURVEY OBSERVATIONS

The building envelope components observed during the field survey included the exterior wall construction, window glazing and roof construction. The general observations for these building components are summarize below.

- Exterior Wall Construction Brick and concrete masonry construction (except the Branch PXs and Gymnasium buildings where a portion of the wall construction consists of insulated metal panels).
- Window Glazing Double pane glazing with insulated panels on the top one-third of the window frames.

• Roof Construction - As shown on the as-built drawings with 6 inches of fiberglass batt insulation installed after the original construction (except the barracks and gymnasium buildings where fiberglass batt insulation could not be easily installed).

The interior building components which impact this study include the interior structures, equipment and fixtures on or adjacent to the interior wall, and the process equipment that produce internal gains. The interior structures, equipment, and fixtures observed during the field survey include the following:

- Architectural (interior partitions, wall placards, drapery rods and valances, Venetian blinds, shelves, cabinets, and doors).
- Plumbing (latrine sinks, commodes, toilet stalls, water fountains, and slop sinks).
- HVAC Mechanical (floor supply and return grilles, ceiling supply and return grilles, finned-tube baseboard radiation, thermostats, space temperature sensors, fan coil units, and hot and cold water piping).
- Electrical (panels, outlets, light switches, conduit, disconnect boxes, and wall-mounted televisions).
- Lighting (wall-mounted and ceiling-mounted fixtures, emergency lighting, and exit signs).
- Fire Protection (alarm pull switches, alarm sound devices, sprinkler heads, and fire extinguishers).
- Communications (wall-mounted telephones, booth-mounted telephones, and telephone jacks).

The process equipment that produce internal gains observed during the field survey included the following:

- Office equipment (computers, computer printers, typewriters, and copiers).
- Kitchen equipment (refrigerators, ovens, coffee pots, deep-fat fryers, dishwashers, and freezers).
- Entertainment equipment (televisions and video games).
- Laundry equipment (washing machines and clothes dryers).

The mechanical and electrical systems were observed during the field survey. The nameplate information and data was recorded for the equipment. The mechanical and electrical systems include the following:

- HVAC equipment (air handling units, fan coils, baseboard radiation units, pumps, chillers, boilers, and steam-to-hot water converters).
- HVAC controls (thermostat types and set points, equipment control types and set points).
- Lighting (number, type, and wattage of fixtures).

The ten representative buildings were the primary focus of the field survey. The remaining ninety buildings were observed during walk-throughs to document whether they were identical or similar to the representative buildings for the purpose of extrapolating the energy savings and investment costs. The following table presents a summary of the buildings and whether they are identical or similar to the ten representative buildings.

Table 3-2. Identical and Similar Buildings

Bldg No.	Bldg Name	Sq Ft	Use	Reprsnt Bldg	Identical Bldgs	Similar Bldgs	Variance from Representative Bldg.
639	Branch PX	5,413	Retail Store	х			
744	Branch PX	6,240	Retail Store			Х	Phone Center w / 8 booths along west wall.
835	Branch PX	6,240	Retail Store			Х	Same as Bldg 744, but no Phone Center
1026	Branch PX	8,533	Retail Store			Х	Larger Facility; Interior equipment and objects different
636	Brigade HQ	9,236	Administration	Х			
741	Brigade HQ	9,236	Administration		Х		
844	Brigade HQ	9,890	Administration			Х	Same as 636 with minor variances
1018	Brigade HQ	9,890	Administration			Х	Same as 636 with minor variances
637	Chapel	8,949	Church and Administration	х			
742	Chapel	8,949	Church and Administration		X		
843	Chapel	8,890	Church and Administration			Х	Same as 637 with minor variances
630	Mess Hall	13,280	Dining Facility	Х			
632	Mess Hall	13,280	Dining Facility		Х		
653	Mess Hall	13,280	Dining Facility		Х		
657	Mess Hall	13,280	Dining Facility		Х		
735	Mess Hall	13,280	Dining Facility		Х		
739	Mess Hall	13,280	Dining Facility		Х		
749	Mess Hall	13,280	Dining Facility		Х		

Table 3-2. Identical and Similar Buildings

Bldg No.	Bldg Name	Sq Ft	Use	Represnt	Identical	Similar	Variance from Representative Bldg.
754	Mess Hall	13,280	Dining Facility	Bldg	Bldgs X	Bldgs	Representative Blag.
820	Mess Hall	13,280	Dining Facility		X		
821	Mess Hall	13,280	Dining Facility		X		
836	Mess Hall	13,280	Dining Facility		X		
837	Mess Hall	13,280	Dining Facility		X		1
1010	Mess Hall	13,280	Dining Facility		Х		
1011	Mess Hall	13,280	Dining Facility		Х		
1027	Mess Hall	13,280	Dining Facility		Х		
638	Administration Bldg	3,700	Administration	х	- 2		
743	Administration Bldg	3,700	Administration		х		
832	Administration Bldg	3,700	Administration		Х		
640	Gymnasium	20,425	Sports Facility	Х			
746	Gymnasium	20,425	Sports Facility		Χ		
826	Gymnasium	20,425	Sports Facility		Χ		
626	Admin/Supply	12,155	Admin and Supply		х		
633	Admin/Supply	12,134	Admin and Supply		х		
655	Admin/Supply	12,134	Admin and Supply	Х			
656	Admin/Supply	12,134	Admin and Supply		Х		
733	Admin/Supply	12,155	Admin and Supply		Х		
734	Admin/Supply	12,155	Admin and Supply		Х	·	
751	Admin/Supply	12,155	Admin and Supply		Х		
752	Admin/Supply	12,155	Admin and Supply		X		
823	Admin/Supply	12,155	Admin and Supply		Х		
824	Admin/Supply	12,155	Admin and Supply		х		
840	Admin/Supply	12,155	Admin and Supply		х		
841	Admin/Supply	12,155	Admin and Supply		Х		
1006	Admin/Supply	12,155	Admin and Supply		Х		
1007	Admin/Supply	12,155	Admin and Supply		Х		
1025	Admin/Supply	12,155	Admin and Supply		Х		
627	Barracks, with A/C	40,640	Barracks		х		
628	Barracks, with A/C	40,640	Barracks		Х		

Table 3-2. Identical and Similar Buildings

Bldg No.	Bldg Name	Sq Ft	Use	Reprsnt Bldg	Identical Bldgs	Similar Bldgs	Variance from Representative Bldg.
629	Barracks, with A/C	40,640	Barracks		Х		
634	Barracks, with A/C	40,990	Barracks		х		
635	Barracks, with A/C	40,990	Barracks		Х		
651	Barracks, with A/C	40,990	Barracks	Х			
652	Barracks, with A/C	40,990	Barracks		Х		
654	Barracks, with A/C	40,990	Barracks		Х		
659	Barracks, with	40,990	Barracks		Х		
660	Barracks, with	40,990	Barracks Barracks		Х		
1012	Barracks, with	40,640	Barracks		X		
1013	Barracks, with A/C Barracks, with	40,640	Barracks		X		
1014	A/C Barracks, with	40,640	Barracks		X		
1015	A/C Barracks, with	40,640	Barracks		X		
1018	A/C Barracks, with	40,640	Barracks		X X		
1029	A/C Barracks, with	40,640	Barracks		X		
	A/C	40,640	Barracks				
730	Barracks, without A/C		Barracks	X			
731	Barracks, without A/C	40,640 40,640	Barracks		X		
736	Barracks, without A/C Barracks,	40,640	Barracks		X		
737 738	without A/C Barracks,	40,640	Barracks		X		
	without A/C	40,640	Barracks		X		
747	Barracks, without A/C Barracks,	40,640	Barracks		X		
748 755	without A/C Barracks,	40,640	Barracks		X		
755 756	without A/C Barracks,	40,640	Barracks		X		
757	without A/C Barracks,	40,640	Barracks		X		
815	without A/C Barracks,	40,640	Barracks		X		
816	without A/C Barracks,	40,640	Barracks		X		
817	without A/C Barracks,	40,640	Barracks		X		
818	without A/C Barracks,	40,640	Barracks				
010	without A/C	70,040	Darracks		Х		

Table 3-2. Identical and Similar Buildings

	 						
Bldg No.	Bldg Name	Sq Ft	Use	Reprsnt Bldg	Identical Bldgs	Similar Bldgs	Variance from Representative Bldg.
819	Barracks, without A/C	40,640	Barracks	Diug	X	Blugs	1
827	Barracks, without A/C	40,640	Barracks		х		
828	Barracks, without A/C	40,640	Barracks		х		
829	Barracks, without A/C	40,640	Barracks		х		
830	Barracks, without A/C	40,640	Barracks		х		
831	Barracks, without A/C	40,640	Barracks		х		
625	Battalion HQ	6,163	Administration	Х			
631	Data Processing Center	6,163	Administration			х	Additional equipment and fire suppression system
650	Battalion HQ	6,163	Administration		Х		
658	Battalion HQ	6,163	Administration		Х		
732	Battalion HQ	6,163	Administration		Х		
74 0	Battalion HQ	6,163	Administration		Х		
7 50	Battalion HQ	6,163	Administration		Х		
753	Battalion HQ	6,163	Administration		Х		
822	Battalion HQ	6,163	Administration		Х		
825	Battalion HQ	6,163	Administration		χ		
838	Battalion HQ	6,163	Administration			Х	Same as 625 with minor variances
842	Battalion HQ	6,163	Administration			х	Same as 625 with minor variances
1008	Battalion HQ	6,163	Administration		Х		
1009	Battalion HQ	6,163	Administration		Х		
1022	Battalion HQ	6,163	Administration		Х		
1023	Battalion HQ	6,163	Administration		Х		

4. METHOD OF ANALYSIS

4.1 GENERAL

The method of analysis used in this study is presented in the following subsections, and includes the optimum insulation analysis, energy savings calculations, determination of construction costs, and life cycle cost analysis (LCCA). The optimum insulation analysis was initially performed to determine the optimum thicknesses of insulation for use in the energy savings calculations. The energy savings calculations and construction costs were computed for the energy conservation opportunities (ECOs) evaluated. The energy savings and construction costs were used in the LCCAs to determine the Savings-to-Investment Ratios (SIRs) and Simple Paybacks for the ECOs.

4.2 OPTIMUM INSULATION ANALYSIS

Three categories of insulation construction were evaluated for the purpose of increasing the R-value of exterior walls and roofs. The R-value is a measure of thermal resistance to heat flow through a material. Installing insulation on the exterior walls and roof will increase the total R-values, and therefore will reduce heat loss and provide energy savings. The three categories of insulation evaluated for the walls and roof are as follows:

- Fiberglass batt insulation installed on walls
- Rigid insulation installed on walls
- Fiberglass batt insulation installed on roof.

A life cycle cost was performed for each of the three categories of insulation construction. The life cycle cost sheets, with a graphical presentation of the results for these categories, are presented on pages 4-5 through 4-10.

The life cycle costs were performed to determine the optimum wall R-values and the roof R-value that would be the most cost effective at Fort Leonard Wood. A representative building (Building 625 - Battalion Headquarters) was chosen as a model building to evaluate the life cycle costs. Building 625 was modeled on the BEACON energy analysis computer program to determine its existing energy use. Several thicknesses of insulation were chosen to evaluate the three categories of insulation construction. A separate computer energy simulation was performed for each thickness of insulation to determine the energy use associated with increased R-values. The thicknesses of insulation evaluated in the life cycle costs are presented in Table 4-1 below.

Table 4-1. Thicknesses of Insulation Evaluated

Insulation Category	Thickne	sses of In	sulation	Evaluate	d in Life	Cycle Co	sts (in.)
Wall w/ Fiberglass Batt Insulation	0	1.0	3.5	6.0	9.0	12.0	-
Wall w/ Rigid Insulation	0	0.75	1.0	1.5	2.0	2.5	3.0
Roof w/ Fiberglass Batt Insulation	0	1.0	3.5	6.0	9.0	12.0	_

The life cycle costs also include the following parameters:

- R-values for Walls or Roofs with Insulation Installed
- Area of Walls or Roofs
- Total Investment Cost for Installing Insulation
- Annual Energy Use and Energy Costs
- Discounted Energy Costs
- Total Life Cycle Costs

The R-value for a wall is the sum of the R-values of the components that constitute the wall. The existing walls in Building 625 are brick and concrete masonry block construction without insulation, which are representative of the buildings evaluated in this study. Similarly, the roof R-value is the sum of the R-values of its components. The following table summarizes the R-values used in the life cycle costs.

Table 4-2. R-Values Used in Life Cycle Costs

R-values for Walls w/ Fiberglass Insulation											
	Thicknesses of Insulation Installed on Wall										
Wall Materials	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	-				
Outside Air Film	0.17	0.17	0.17	0.17	0.17	0.17	-				
4 in. Face Brick	0.43	0.43	0.43	0.43	0.43	0.43	-				
2 in. Air Space	0.91	0.91	0.91	0.91	0.91	0.91	<u>-</u>				
6 in. Concrete Masonry Block	1.89	1.89	1.89	1.89	1.89	1.89	-				
Fiberglass Batt Insulation	- 0.00	3.70	11.00	19.00	30.00	38.00	-				
1/2 in. Gypsum Board	0.00	0.45	0.45	0.45	0.45	0.45	-				
Inside Air Film	0.68	0.68	0.68	0.68	0.68	0.68	-				
Total R-value for Wall	4.08	8.23	15.53	23.53	34.53	42.53	-				

R-values for Walls w/ Rigid Insulation											
	Thicknesses of Insulation Installed on Wall										
Wall Materials	0 in.	0.75 in.	1 in.	1.5 in.	2 in.	2.5 in.	3 in.				
Outside Air Film	0.17	0.17	0.17	0.17	0.17	0.17	0.17				
4 in. Face Brick	0.43	0.43	0.43	0.43	0.43	0.43	0.43				
2 in. Air Space	0.91	0.91	0.91	0.91	0.91	0.91	0.91				
6 in. Concrete Masonry Block	1.89	1.89	1.89	1.89	1.89	1.89	1.89				
Rigid Insulation	0.00	5.40	7.20	10.80	14.40	18.00	21.60				
3/4 in. Reflective Air Space	0.00	2.77	2.77	2.77	2.77	2.77	2.77				
1/2 in. Gypsum Board	0.00	0.45	0.45	0.45	0.45	0.45	0.45				
Inside Air Film	0.68	0.68	0.68	0.68	0.68	0.68	0.68				
Total R-value for Wall	4.08	12.70	14.50	18.10	21.70	25.30	28.90				

R-values for Roof w/ Fiberglass Insulation							
	Thicknesses of Insulation Installed on Roof						
Roof Materials	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	-
Outside Air Film	0.17	0.17	0.17	0.17	0.17	0.17	-
Built-up Roofing	0.33	0.33	0.33	0.33	0.33	0.33	
1 in. Insulation	3.85	3.85	3.85	3.85	3.85	3.85	-
Steel Deck	0.00	0.00	0.00	0.00	0.00	0.00	-
Air Space	0.91	0.91	0.91	0.91	0.91	0.91	
Fiberglass Batt Insulation	0.00	3,70	11.00	19.00	30.00	38.00	
Acoustic Ceiling Tile	1.79	1.79	1.79	1.79	1.79	1.79	-
Inside Air Film	0.68	0.68	0.68	0.68	0.68	0.68	-
Total R-value for Roof	7.73	12.70	18.73	26.73	37.73	45.73	-

The wall areas were calculated using dimensions from as-built drawings. The roof area was also taken from the as-built drawings.

The total investment costs for installing insulation include the construction costs, supervision-inspection-overhead (SIOH) costs, and the design costs. The SIOH costs are 7% of the construction cost, and the design costs are 6% of the construction costs.

A total of eighteen computer energy simulations were performed to evaluate the optimum insulation thicknesses. The BEACON energy analysis program was used for the computer energy simulations. These energy simulations are presented in Appendix C. The annual energy use for each thickness of insulation was taken from the BEACON Systems Totals output reports. The heating MBtus for natural gas and the cooling kWh for electricity were entered into the life cycle costs. The annual energy costs were calculated by multiplying the unit costs for natural gas (\$5.30/MBtu) and the electricity (\$0.025/kWh) by the annual energy use for each.

The annual energy costs were discounted using the discount factors from the Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1996 - NISTIR 85-3273-10 (Rev. 10/95). The discount factors from the Census Region 2, Industrial, and a 20-year economic

life were selected. The discount factor for natural gas (17.76) and for electricity (13.80) were multiplied by the annual natural gas costs and electricity costs respectively.

The total life cycle costs for each insulation thickness were obtained by adding the total discounted annual energy costs and the total investment costs together. The life cycle cost sheets are presented on the following pages.

LIFE CYCLE COST - INSTALL FIBERGLASS BATT INSULATION ON WALLS

Economic Life (yrs)
20

Natural Gas Cost (\$/MBTU)	5.30
Electric Energy Cost (kWh)	0.025

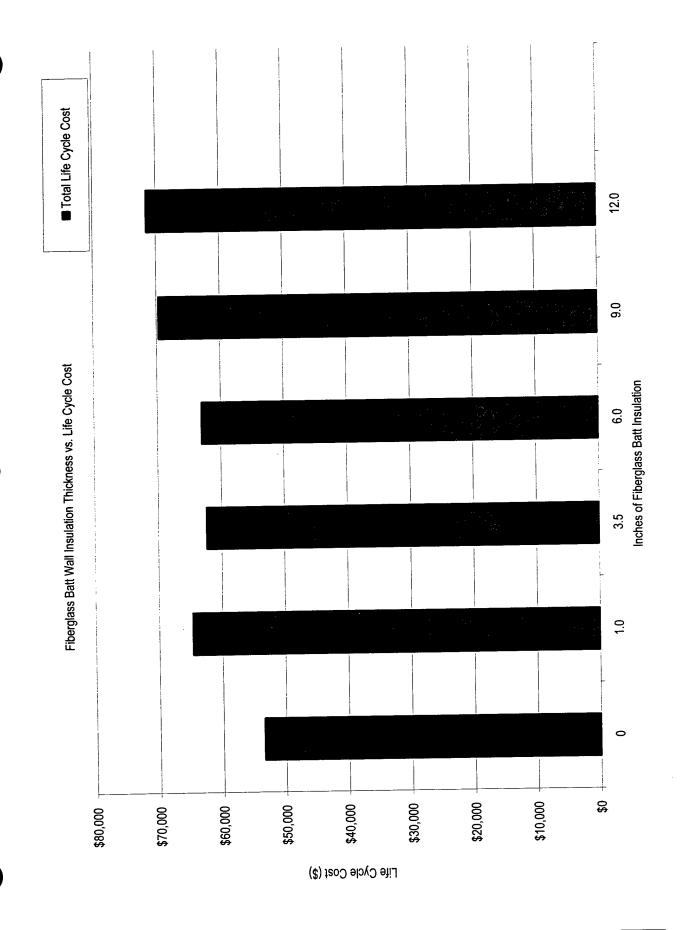
Construction Cost

Building No	. 625 - Battalio	n Headquarters	- Fort Leonard \	Wood, Missouri		
all Insulation Thickness (in.)	0	1.0	3.5	6.0	9.0	12.0
all R-value with Insulation Installed	3.40	7.02	14.85	22.85	33.85	41.85
Wall Area (sq ft)	3370	3370	3370	3370	3370	3370
Material Cost Per Sq Ft	0	0.831	0.821	1.025	1.576	1.880
Total Material Cost	\$ 0	\$2,800	\$2,767	\$3,454	\$5,311	\$6,336
		-				
Labor Hours Per SqFt	0	0.076	0.076	0.078	0.105	0.107
Labor Rate	0	24.60	24.60	24.60	24.60	24.60
Total Labor Cost	\$0	\$6,301	\$6,301	\$6,466	\$8,705	\$8,871
Total Cost	\$0	\$9,101	\$9,067	\$9,921	\$14,016	\$15,206
Overhead, Bond, Profit, & Conting.	\$0	\$5,060	\$5,041	\$5,515	\$7,792	\$8,454
Construction Cost	\$0	\$14,161	\$14,108	\$15,436	\$21,808	\$23,660

Life Cycle Cost

Fiberglass Batt Insulation Thickness (in.)	0	1.0	3.5	6.0	9.0	12.0
nvestment Costs						
Construction Cost	\$0	\$14,161	\$14,108	\$15,436	\$21,808	\$23,660
SIOH (7.0%)	\$0	\$991	\$988	\$1,081	\$1,527	\$1,656
Design Cost (6.0%)	\$0	\$850	\$846	\$926	\$1,308	\$1,420
Total Construction Cost	\$0	\$16,002	\$15,942	\$17,443	\$24,643	\$26,736
Total Investment	\$0	\$16,002	\$15,942	\$17,443	\$24,643	\$26,736
Annual Energy Use						
Natural Gas (MBTU)	480.89	434.48	413.80	406.05	401.34	398.86
Electric Energy (kWh)	23720	22520	21590	21270	21030	20920
Annual Energy Cost						
Natural Gas Cost	\$2,549	\$2,303	\$2,193	\$2,152	\$2,127	\$2,114
Electric Cost	\$593	\$563	\$540	\$532	\$526	\$523
Discount Factors (Region 2)						
Natural Gas	17.76	17.76	17.76	17.76	17.76	17.76
Electric	13.80	13.80	13.80	13.80	13.80	13.80
Discounted Annual Energy Cost						
Natural Gas Discounted Cost	\$45,265	\$40,897	\$38,950	\$38,221	\$37,777	\$37,544
Electric Discounted Cost	\$8,183	\$7,769	\$7,449	\$7,338	\$7,255	\$7,217
Total Discounted Annual Energy Cost	\$53,449	\$48,666	\$46,399	\$45,559	\$45,033	\$44,761
Total Life Cycle Cost	\$53,449	\$64,668	\$62,341	\$63,001	\$69,676	\$71,497

(Total Life Cycle Cost includes Total Investment Cost + Total Discounted Energy Cost)



LIFE CYCLE COST - INSTALL RIGID INSULATION ON WALLS

Economic Life (yrs)	
20	

Natural Gas Cost (\$/MBTU)	5.30
Electric Energy Cost (kWh)	0.025

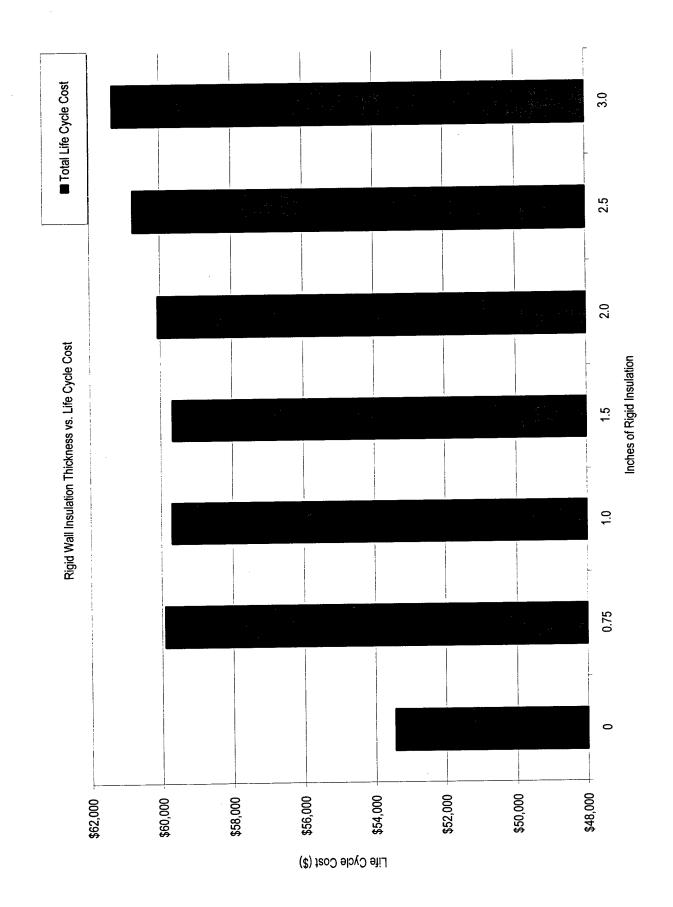
Construction Cost

· Build	ding No. 625 -	Battalion Heado	uarters - Fort L	eonard Wood, I	Missouri		
all Insulation Thickness (in.)	0	0.75	1.0	1.5	2.0	2.5	3.0
all R-value	3.40	10.91	12.51	17.02	20.62	24.22	27.82
Wall Area (sqft)	3370	3370	3370	3370	3370	3370	3370
Material Cost Per Sq Ft	0	0.83	0.87	0.96	1.10	1.23	1.36
Total Material Cost	\$0	\$2,797	\$2,932	\$3,235	\$3,707	\$4,145	\$4,583
Labor Hours Per Sq Ft	0	0.053	0.053	0.053	0.054	0.054	0.054
Labor Rate (\$/hr)	0	24.60	24.60	24.60	24.60	24.60	24.60
Total Labor Cost	\$0	\$4,394	\$4,394	\$4,394	\$4,477	\$4,477	\$4,477
Total Cost	\$0	\$7,191	\$7,326	\$7,629	\$8,184	\$8,622	\$9,060
Overhead, Bond, Profit, & Conting.	\$0	\$3,998	\$4,073	\$4,241	\$4,550	\$4,793	\$5,037
Construction Cost	\$0	\$11,189	\$11,398	\$11,870	\$12,733	\$13,415	\$14,09

Life Cycle Cost

Rigid Insulation Thickness (in.)	0	0.75	1.0	1.5	2.0	2.5	3.0
Investment Costs							
Construction Cost	\$0	\$11,189	\$11,398	\$11,870	\$12,733	\$13,415	\$14,097
SIOH (7.0%)	\$0	\$783	\$798	\$831	\$891	\$939	\$987
Design Cost (6.0%)	\$0	\$671	\$684	\$712	\$764	\$805	\$846
Total Construction Cost	\$0	\$12,643	\$12,880	\$13,413	\$14,389	\$15,159	\$15,929
Total Investment	\$0	\$12,643	\$12,880	\$13,413	\$14,389	\$15,159	\$15,929
Annual Energy Use							
Natural Gas (MBTU)	480.89	422.02	417.84	412.68	407.21	406.71	404.85
Electric Energy (kWh)	23720	21860	21720	21490	21320	21220	21130
Annual Energy Cost							
Natural Gas Cost	\$2,549	\$2,237	\$2,215	\$2,187	\$2,158	\$2,156	\$2,146
Electric Cost	\$593	\$547	\$543	\$537	\$533	\$531	\$528
Discount Factors (Region 2)							
Natural Gas	17.76	17.76	17.76	17.76	17.76	17.76	17.76
Electric	13.8	13.80	13.80	13.80	13.80	13.80	13.80
Discounted Annual Energy Cost		-4					
Natural Gas Discounted Cost	\$45,265	\$39,724	\$39,330	\$38,845	\$38,330	\$38,283	\$38,108
Electric Discounted Cost	\$8,183	\$7,542	\$7,493	\$7,414	\$7,355	\$7,321	\$7,290
Total Discounted Annual Energy Cost	\$53,449	\$47,266	\$46,824	\$46,259	\$45,685	\$45,604	\$45,398
Total Life Cycle Cost	\$53,449	\$59,909	\$59,704	\$59,672	\$60,074	\$60,763	\$61,327

(Total Life Cycle Cost includes Total Investment Cost + Total Discounted Energy Cost)



LIFE CYCLE COST - INSTALL FIBERGLASS BATT INSULATION ON ROOF

Economic Life (yr	s)
20	

Electric Energy Cost (\$/MBTU	5.30
Electric Energy Cost (\$/kWh)	0.025

Construction Cost

Building No.	625 - Battalio	n Headquarters	- Fort Leonard	Wood, Missour	i	
of Insulation Thickness (in.)	0	1	3.5	6	9	12
of R-value including Ceiling Space	7.73	11.40	18.73	26.73	37.73	45.73
Roof Area (sq ft)	5795	5795	5795	5795	5795	5795
Material Cost Per Sq Ft	0	0.20	0.22	0.28	0.45	0.61
Total Material Cost	\$0	\$1,159	\$1,275	\$1,623	\$2,608	\$3,535
Labor Hours Per Sq Ft	0	0.005	0.005	0.006	0.007	0.008
Labor Rate	0	24.60	24.60	24.60	24.60	24.60
Total Labor Cost	\$0	\$713	\$713	\$855	\$998	\$1,140
Total Cost	\$0	\$1,872	\$1,988	\$2,478	\$3,606	\$4,675
Overhead, Bond, Profit, & Conting.	\$0	\$1,041	\$1,105	\$1,378	\$2,005	\$2,599
Construction Cost	\$0	\$2,912	\$3,093	\$3,856	\$5,610	\$7,275

Life Cycle Cost

Fiberglass Batt Roof Insul. Thickness (in.)	0	1	3.5	6	9	12
investment Costs						
Construction Cost	\$0	\$2,912	\$3,093	\$3,856	\$5,610	\$7,275
SIOH (7.0%)	\$0	\$204	\$217	\$270	\$393	\$509
Design Cost (6.0%)	\$0	\$175	\$186	\$231	\$337	\$437
Total Construction Cost	\$0	\$3,291	\$3,495	\$4,357	\$6,339	\$8,221
Total Investment	\$0	\$3,261	\$3,464	\$4,319	\$6,283	\$8,148
Annual Energy Use						
Natural Gas (MBTU)	604.38	562.52	527.37	480.95	479.13	478.47
Electric Energy (kWh)	23110	23350	23370	23720	23710	23710
Annual Energy Cost						
Natural Gas Cost	\$3,203	\$2,981	\$2,795	\$2,549	\$2,539	\$2,536
Electric Cost	\$578	\$584	\$584	\$593	\$593	\$593
Discount Factors (Region 2)	•					
Natural Gas	17.76	17.76	17.76	17.76	17.76	17.76
Electric	13.80	13.80	13.80	13.80	13.80	13.80
Discounted Annual Energy Cost		<u> </u>				
Natural Gas Discounted Cost	\$56,889	\$52,949	\$49,640	\$45,271	\$45,100	\$45,037
Electric Discounted Cost	\$7,973	\$8,056	\$8,063	\$8,183	\$8,180	\$8,180
Total Discounted Annual Energy Cost	\$64,862	\$61,005	\$57,703	\$53,454	\$53,279	\$53,217
Total Life Cycle Cost	\$64,862	\$64,266	\$61,167	\$57,773	\$59,562	\$61,365

(Total Life Cycle Cost includes Total Investment Cost + Total Discounted Energy Cost)

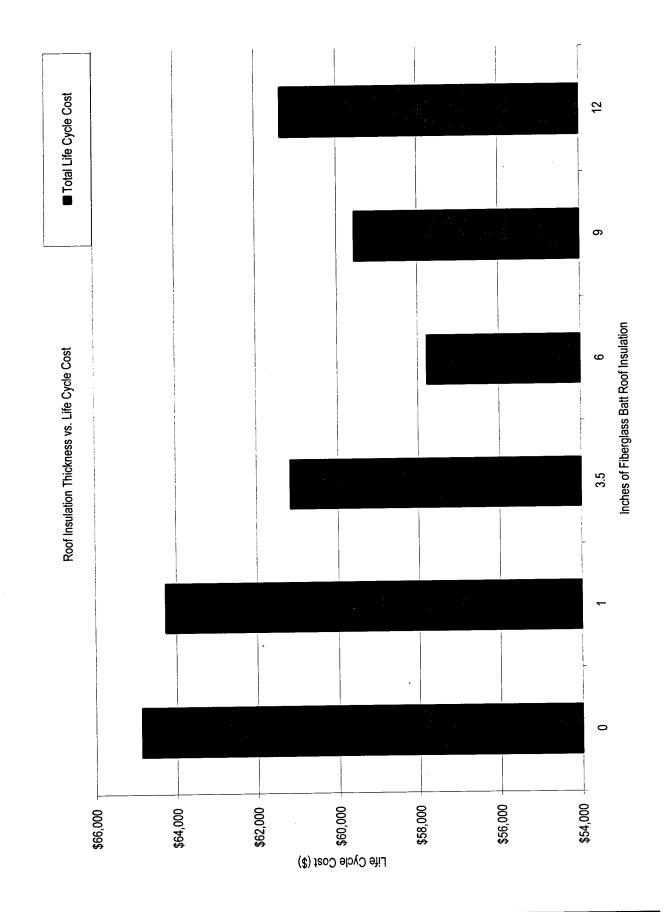


Table 4-3 below summarizes the life cycle costs for the three categories of insulation construction.

Table 4-3. Summary of Life Cycle Costs

			Life	Cycle Cos	sts (\$)		
Insulation Category	Thickn	esses of I	iberglas	s Batt Ins	ulation I	nstalled o	n Walls
	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	-
Wall w/ Fiberglass Batt Insul.	53,449	64,526	61,767	62,414	69,024	70,827	-
	Th	icknesse	s of Rigid	l Insulati	on Instal	led on W	alls
	0 in.	0.75 in.	1 in.	1.5 in.	2 in.	2.5 in.	3 in.
Wall w/ Rigid Insulation	53,449	59,364	59,157	59,120	59,513	60,195	60,753
	Thickn	esses of	Fiberglas	s Batt Ins	ulation I	nstalled	on Roof
	0 in.	1 in.	3.5 in.	6 in.	9 in.	12 in.	
Roof w/ Fiberglass Batt Insul.	64,862	64,266	61,167	57,773	59,562	61,365	-

The lowest life cycle costs for insulation installed are the shaded items above. These life cycle costs represent the optimum thicknesses of insulation to be installed on walls and roof. Table 4-4 below presents the optimum thicknesses of insulation.

Table 4-4 Optimum Insulation Thickness

Insulation Category	Optimum Insulation Thickness
Wall w/ Fiberglass Batt Insulation	3.5 in.
Wall w/ Rigid Insulation	1.5 in.
Roof w/ Fiberglass Batt Insulation	6.0 in.

The optimum wall insulation thicknesses are used in evaluating energy savings for the two types of wall insulation.

The roof insulation was evaluated for its optimum thickness to compare it to the existing thickness of roof insulation. The field survey revealed that the existing roof construction in seven of the ten representative buildings contained an additional 6 inches of fiberglass batt insulation. These buildings have been retrofitted with the optimum thickness of roof insulation. The three representative buildings which have not been retrofitted with fiberglass batt insulation are the barracks, Buildings 651 and 730, and the gymnasium, Building 826. The existing roof constructions in the barracks and gymnasium buildings have ceilings open to the space. For fiberglass batt insulation to be installed economically, a suspended ceiling would also be required. Installing fiberglass batt insulation plus a

suspended ceiling would be costly compared to the small amount of energy dollars saved. Installing additional insulation in the barracks and gymnasium buildings is not recommended. Therefore, no further evaluation was performed for roof insulation.

4.3 ENERGY SAVINGS CALCULATIONS

Building energy baselines for the ten representative buildings were modeled on the BEACON energy analysis computer program. A description of the BEACON energy analysis program is presented in Appendix B. The building energy baselines reflect the existing conditions of the buildings. The as-built drawings and field survey data provided the source for building inputs to the baselines. The building inputs listed below are summarized on the building and internal gains calculation sheets presented in Appendix D. The building inputs for the baselines included the following:

- Building dimensions.
- Construction types for walls, windows, and roof.
- U-values (inverse of R-values) for walls, windows, and roof.
- Building infiltration data.
- Occupants data (number, heat gain parameters, and schedule).
- Lighting data (number, wattage, and schedule).
- Process equipment data (number, wattage, heat gain parameters, and schedule).

The field survey data also provided the source for heating ventilating and air conditioning (HVAC) inputs to the baselines. The HVAC field survey data is presented in Appendix D.

The building energy baselines for the ten representative buildings were used to create ECO energy simulations. The energy simulation for ECO-1 is the baseline with the wall U-values modified to reflect the addition of fiberglass batt wall insulation. Similarly, the energy simulation for ECO-2 is the baseline with the wall U-values modified to reflect the addition of rigid wall insulation.

The annual energy savings for natural gas and electricity for the representative buildings were calculated by subtracting the ECO energy use from the baseline energy use. The energy savings were then extrapolated to similar buildings by prorating the savings on a square foot basis. The annual energy savings summaries for the representative buildings and similar buildings are presented in Appendix D. These annual energy savings were used in the building summary tables in Section 6.

4.4 CONSTRUCTION COSTS

Construction costs were generated for the representative building ECOs. The construction costs for both ECO-1 and ECO-2 included costs for the following:

- Install wall insulation.
- Install gypsum wallboard.
- Tape, level, and paint gypsum wallboard to match adjacent surfaces.
- Install water-proof wallboard with ceramic tile (latrines).
- Relocate interior equipment and objects.

As-built drawings provided dimensions for the wall areas being renovated. Field survey data provided information on the quantity and type of interior equipment and objects required to be relocated. The field survey data for the interior equipment and objects are presented in Appendix D.

A material and labor lookup table was used to create the construction cost sheets. Costs were obtained from the RS Means cost estimating guides and material manufacturers and entered into the lookup table. The material and labor lookup table and manufacturers cutsheets are presented in the first section of Appendix D.

4.5 LIFE CYCLE COST ANALYSES

The LCCAs were completed for the representative building ECOs. A 20 year economic life was used in the LCCAs. The discount factors were obtained from the Energy Price Indices and Discount Factors for Life-Cycle Cost Analysis 1996 - NISTIR 85-3273-10 (Rev. 10/95). The construction costs were entered into the LCCA calculation sheets.

The investment costs for the representative buildings were extrapolated to similar buildings by prorating the costs on a square foot basis. The investment cost summaries for the representative buildings and similar buildings are presented in Appendix D. These investment costs are used in the building summary tables in Section 6.

The LCCAs calculate SIRs and Simple Paybacks for the ECOs. The Energy Conservation Investment Program (ECIP) Guidance (dated January 1994) was used in the LCCAs. ECOs with SIRs greater than 1.25 and Simple Paybacks less than 10 years will qualify for funding. ECOs with SIRs less than 1.25 and Simple Paybacks greater than 10 years will not qualify for funding.

5. BUILDING DESCRIPTIONS AND RESULTS OF ANALYSIS

5.1 GENERAL

This section provides a description of each representative building including building use, building construction, exterior elevation photograph, building interior, lighting, and HVAC systems. The energy use and energy costs for the representative building baselines are presented. The results of the ECO-1 and the ECO-2 analyses for each representative building are also included.

5.2 BUILDING 639 (BRANCH PX)

Description of Existing Conditions

Building 639 is a 5,413 sq ft one-story building. The original building (4,221 sq ft) was built in 1962, with an 1,192 sq ft addition added later. The building is divided into two areas, a retail store located in the original building and a video arcade located in the addition. The building is open for business 1700 to 2000 hours on Tuesdays through Saturdays and 1300 to 1930 hours on Sundays. The Branch PX has three employees and serves approximately 50 people per day.



The original building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The addition wall construction consists of face brick and concrete masonry block up to a height of five feet, with insulated metal panels from there up to the roof. The roof construction is a built-up roof on 1.5 inches of rigid insulation, a metal deck, ceiling air space, 6 inches of fiberglass batt insulation, and acoustic ceiling tile. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior of the retail store has several clothing shelves along the exterior walls. The interior of the video arcade has several video games and two fan coil units along the exterior walls. The video arcade also has wood paneling covering the walls at a height of 3 feet. The windows have adjustable venetian blinds for window shades.

The lighting in the retail store area is provided by 34 watt fluorescent lamps with standard ballasts. The video arcade lighting is a combination of 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent track lighting.

The retail store is heated and cooled by a three zone multizone air handling unit (MZU). The addition is heated and cooled by two fan coil units. Cooling is provided by two aircooled condensing units, one serving the MZU and the other serving the fan coil units. A central steam plant provides steam heat to the MZU and fan coil units.

Existing Baseline Energy Consumption

The baseline energy use for the Branch PX, reported from the BEACON energy analysis program, is presented on the following page.

Energy Savings Analysis

Two building energy baselines were created for the Branch PX using the BEACON energy analysis program. One baseline was created for the retail store and the other baseline for the video arcade. Energy simulations for ECO-1 and ECO-2 were generated from the baselines to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

Bldg. No.: Bldg. Name:

Bldg. Energy Use (Btu Conditioned Floor Ar

ENERGY UNIT COS
Electricity
Electric Demand
Natural Gas

Branch PX				ELECTRIC	NATURAL
			ELECTRICITY	DEMAND	GAS
rea (Sq Ft):	4,752	ITEM	(kWh)	(kW)	(MBtu)
tu/Sq Ft):	187,411	LIGHTS	25,890	16.33	
		PROC. EQUIP.	27,911	6.15	
OSTS		COOLING	20,410	10.14	
	\$0.0250 /kWh	HEATING			610
	\$74.22 /kW/yr	FANS	7,850	1.18	
	\$5.30 /MBtu				

1,859 1,154 1,263 3,236 284

1,212 457 753 0

647 698 510 0 196

88 95 70 610 27

TOTAL ENERGY COST (\$)

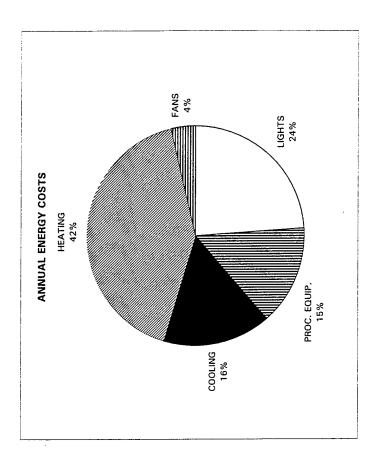
NAT. GAS ENERGY COST (\$)

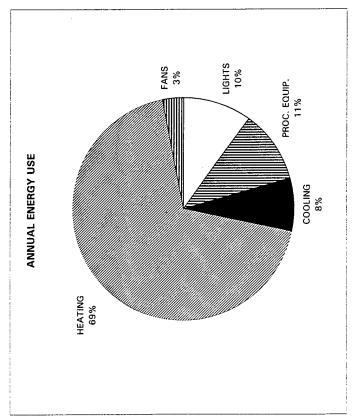
ELECTRIC DEMAND COST (\$)

ELECTRIC ENERGY COST (\$)

TOTAL ENERGY USE (MBtu)

PEAK





The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Branch PX annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
639A	Baseline	541.6	16,600	56.7	27.7	•	•	-
(Store)	ECO-1	497.8	14,370	49.0	26.5	43.8	7.6	1.2
	ECO-2	495.7	14,220	48.5	26.5	45.9	8.1	1.2
639B	Baseline	68.9	3,810	13.0	6.1	-	-	-
(Arcade)	ECO-1	63.6	3,620	12.4	6.0	5.3	0.7	0.1
	ECO-2	62.8	3,580	12.2	6.0	6.2	0.8	0.1
639	ECO-1		*. AM.			49.1	8.3	1.3
	ECO-2					52.1	8.9	1.3

One building in this group had significant differences in interior furnishings and equipment, requiring separate construction costs in addition to the representative building construction costs. This building and its significant difference is noted as follows:

• Building 744 (Branch PX) - Telephone communication center requires relocation of eight telephone booths.

The construction costs for Building 744 is presented in Appendix D.

Results of Energy Savings and Economic Analysis

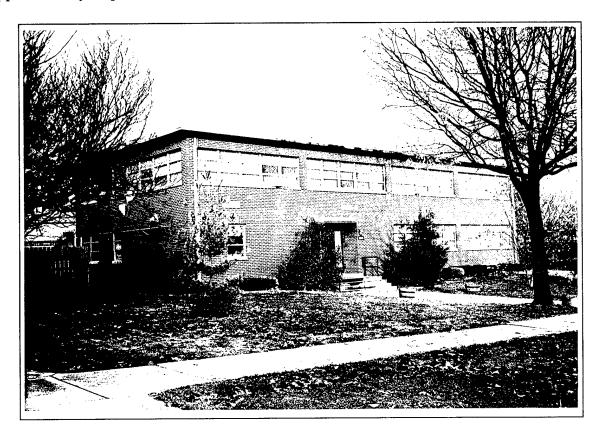
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	. 8.26	8.91
Annual Electric Demand Savings (kW)	1.3	1.3
Annual Natural Gas Savings (MBtu)	49.11	52.05
Total Annual Cost Savings	\$417	\$438
Investment Cost	\$22,547	\$24,302
Savings-to-Investment Ratio (SIR)	0.30	0.29
Simple Payback (yrs)	54.03	55.53

5.3 BUILDING 636 (BRIGADE HEADQUARTERS)

Description of Existing Conditions

Building 636 is a 9,236 sq ft two-story building with a full basement. The building was built in 1962. The building is occupied from 0730 to 1900 hours on Mondays through Fridays. The Brigade Headquarters is an administrative facility for troop logistics and has approximately 30 personnel.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on 3 in. of rigid insulation, a 6.5 in. concrete deck, ceiling air space, 6 in. of fiberglass batt insulation, and acoustic ceiling tile. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior office areas of the Brigade Headquarters have a variety of storage cabinets and credenzas along the exterior walls. The walls are covered with a decorative jute wall covering and wood paneling at a height of 2.5 ft. The windows have adjustable venetian blinds for window shades.

The lighting in the office areas is provided by 40 watt fluorescent lamps with standard ballasts; lighting in the toilets and storage closets is provided by 100 watt incandescent lamps.

The Brigade Headquarters is heated and cooled throughout by fan coil units with outside air for ventilation. The basement is heated by hot water unit heaters. Cooling is provided by an air-cooled water chiller serving the fan coil units. A central steam plant provides steam to a steam-to-hot water converter in the basement mechanical room. The steam-to-hot water converter provides hot water to the fan coil units and unit heaters.

Existing Baseline Energy Consumption

The baseline energy use for the Brigade Headquarters, reported from the BEACON energy analysis program, is presented on the following page.

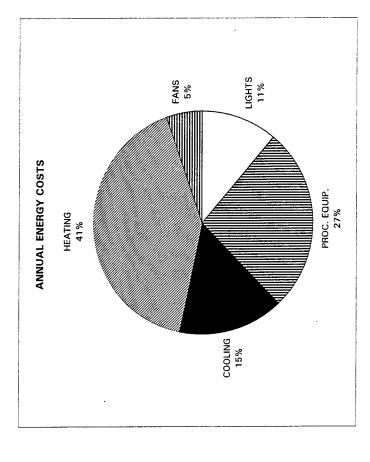
Bldg. No.: 636 Bldg. Name: Brigade HQ

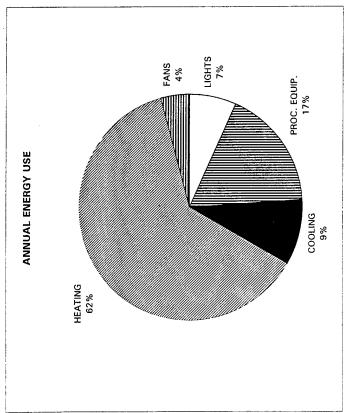
Conditioned Floor Area (Sq Ft): 9,044 Bldg. Energy Use (Btu/Sq Ft): 183,508
 ENERGY UNIT COSTS
 \$0.0250 /kWh

 Electricity
 \$74.22 /kW/yr

 Natural Gas
 \$5.30 /MBtu

13,198	5,474	3,147	4,578	1,658	1,033	42.4	183,102	TOTAL
682	0	163	519		i	2.20	20,750	FANS
5,474	5,474	0	0	1,033	1,032.8			HEATING
2,046	0	897	1,149	157		12.09	45,940	COOLING
3,517	0	1,412	2,105	287		19.02	84,202	PROC. EQUIP.
1,480	0	675	802	110		60'6		LIGHTS
€	9	(\$)	(5)	(MBtu)	(MBtu)	(kW)	(kWh)	ITEM
COST	COST	COST	COST	USE	GAS	DEMAND	ELECTRICITY	
ENERGY	ENERGY	DEMAND	ENERGY	ENERGY	NATURAL	ELECTRIC		
TOTAL	NAT. GAS	ELECTRIC	ELECTRIC	TOTAL		PEAK		





Energy Savings Analysis

The building energy baseline was created for the Brigade Headquarters using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Brigade Headquarters annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
636	Baseline	1,034.8	45,940	156.8	42.4	-	-	-
	ECO-1	991.9	42,570	145.3	41.6	42.9	11.5	0.8
	ECO-2	989.7	42,430	144.8	41.6	45.1	12.0	0.8

Results of Energy Savings and Economic Analysis

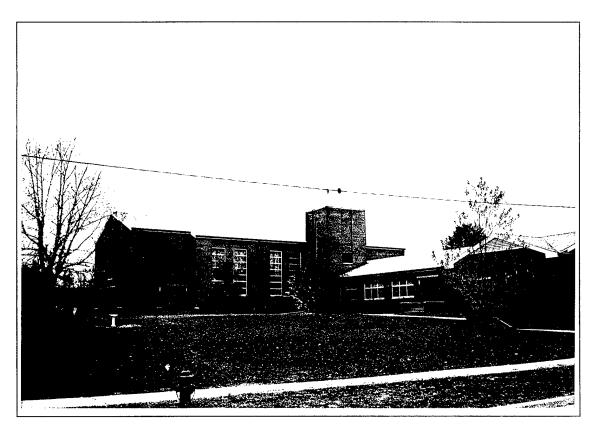
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	11.50	11.98
Annual Electric Demand Savings (kW)	0.8	0.8
Annual Natural Gas Savings (MBtu)	42.90	45.08
Total Annual Cost Savings	\$371	\$386
Investment Cost	\$57,789	\$61,061
Savings-to-Investment Ratio (SIR)	0.10	0.10
Simple Payback (yrs)	155.77	158.17

5.4 BUILDING 637 (CHAPEL)

Description of Existing Conditions

Building 637 is a 8,949 sq ft one-story building built in 1956. The Chapel has a 5,307 sq ft sanctuary with a 300 seat capacity, and a 3,642 sq ft office area for administration. The sanctuary holds religious services from 0700 to 1230 hours on Sundays with a total of 100 people in attendance. The Chapel office area is occupied from 0830 to 1700 hours on Mondays through Fridays and 0630 to 1230 on Saturdays, with five administrative personnel.



The sanctuary wall construction is 4 in. face brick, air space, and 12 in. concrete masonry block. The office area wall construction is the same, except it has 6 in. concrete masonry block. The roof construction for the sanctuary consists of composite shingles on roof felt, plywood sheathing, 1 in. rigid insulation, and a wood deck. The office area roof construction consists of composite shingles on roof felt, plywood sheathing, an attic air space, 3 in. blown-in cellulose insulation, 3 in. fiberglass batt insulation, and gypsum board ceiling. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames. The sanctuary has stained glass windows on the south elevation.

The interior of the sanctuary has painted concrete masonry block walls and wood paneling along the east and west walls at a height of 4 ft. The office area of the Chapel has a variety of storage cabinets and tables along the exterior walls. The walls are painted concrete masonry block. The windows in the sanctuary and office area have cloth draperies for window shades.

The lighting in the sanctuary is provided by 750 watt incandescent lamps. The lighting in the office area is provided by a combination of 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent lamps.

The sanctuary is heated and cooled with a single zone air handling unit (SZ AHU). The office area is heated and cooled by fan coil units with outside air for ventilation. Cooling is provided by two air-cooled condensing units, one serving the SZ AHU and the other serving the fan coil units. A central steam plant provides steam to two steam-to-hot water converters in the basement mechanical room. One steam-to-hot water converter provides hot water to the SZ AHU, the other provides hot water to the fan coil units.

Existing Baseline Energy Consumption

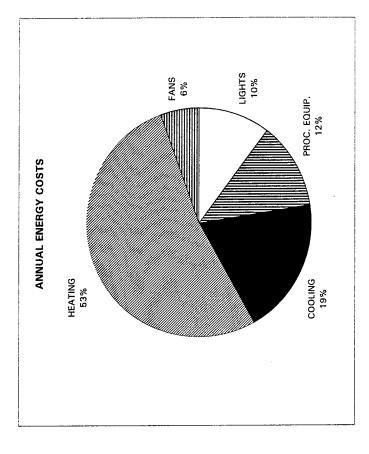
The baseline energy use for the Chapel, reported from the BEACON energy analysis program, is presented on the following page.

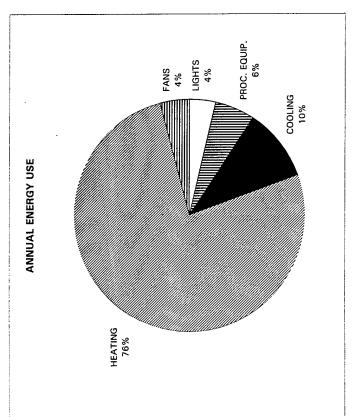
637 Chapel Bldg. No.: Bldg. Name: 7,836 Conditioned Floor Area (Sq Ft): Bldg. Energy Use (Btu/Sq Ft):

ENERGY UNIT COSTS
Electricity

\$0.0250 /kWh \$74.22 /kW/yr \$5.30 /MBtu Electric Demand Natural Gas

		PEAK		TOTAL	ELECTRIC	ELECTRIC	NAT. GAS	TOTAL
		ELECTRIC	NATURAL	ENERGY	ENERGY	DEMAND	ENERGY	ENERGY
	ELECTRICITY	DEMAND	GAS	USE	COST	COST	COST	COST
ITEM	(kWh)	(kW)	(MBtu)	(MBtu)	(\$)	€	9	€
LIGHTS	16,910	11.48		28	423	852	0	1,275
PROC. EQUIP.	26,642	12.06		91	999	895	0	1,561
COOLING	50,190	15.88		171	1,255	1,179	0	2,434
HEATING			1,246.8	1,247	0	0	809'9	809'9
FANS	20,190	2.57		69	202	191	0	969
		4						
TOTAL	113,932	42.0	1,247	1,636	2,848	3,117	809'9	12,574





Energy Savings Analysis

Two building energy baselines were created for the Chapel using the BEACON energy analysis program. One baseline was created for the sanctuary and the other baseline for the office area. Energy simulations for ECO-1 and ECO-2 were generated from the baselines to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Chapel annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
637A	Baseline	1,172.6	35,550	121.3	28.3	-	•	-
(Sanctu-	ECO-1	962.1	26,470	90.3	26.4	210.6	31.0	1.9
ary)	ECO-2	959.5	26,200	89.4	26.4	213.1	31.9	1.9
637B	Baseline	74.2	14,640	50.0	13.7	-	-	-
(Office	ECO-1	55.3	13,180	45.0	12.9	18.9	5.0	0.8
Area)	ECO-2	54.5	13,080	44.6	12.8	19.6	5.3	0.9
637	ECO-1					229.5	36.0	2.7
	ECO-2					232.8	37.2	2.8

Results of Energy Savings and Economic Analysis

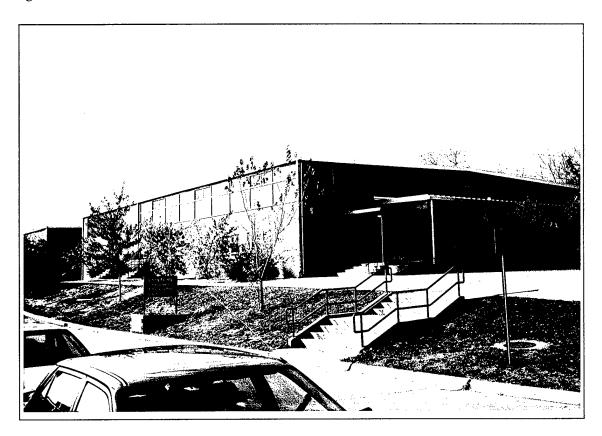
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	35.97	37.24
Annual Electric Demand Savings (kW)	· 2.7	2.8
Annual Natural Gas Savings (MBtu)	229.45	232.76
Total Annual Cost Savings	\$1,680	\$1,714
Investment Cost	\$59,688	\$63,708
Savings-to-Investment Ratio (SIR)	0.47	0.45
Simple Payback (yrs)	35.53	37.16

5.5 BUILDING 630 (MESS HALL)

Description of Existing Conditions

Building 630 is a 13,280 sq ft one-story building built in 1956. The Mess Hall has a 4,593 sq ft kitchen, and a 8,687 sq ft dining room. The Mess Hall is open from 0300 to 2100 hours on Mondays through Fridays and 0800 to 1900 on Saturdays and Sundays. The kitchen has approximately 20 service personnel. Approximately 270 personnel are served daily in the dining room.



The Mess Hall wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction consists of a built-up roof on 1.5 inches of rigid insulation, a metal deck, ceiling air space, 6 inches of fiberglass batt insulation, and a plaster ceiling. The windows are clear, double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-half of the frames.

The kitchen has ceramic tile block on the interior surface of walls to facilitate frequent washing. The kitchen has equipment and sinks located along the exterior walls. The dining room has a combination of painted concrete masonry block, ceramic tile block, and insulated metal panels on the interior surface of walls. The windows have cloth draperies for window shades.

The lighting in the Mess Hall is provided by a combination of 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent lamps.

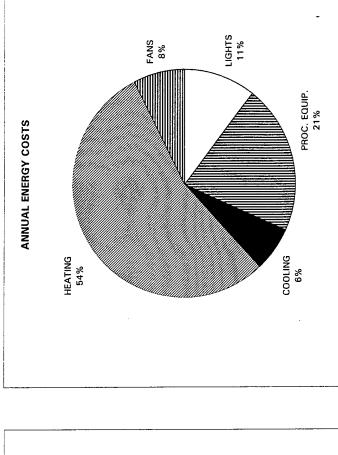
The kitchen is heated and ventilated with two heating and ventilating units (H&Vs). The dining room is heated and cooled with two single zone air handling units (SZ AHUs). Cooling is provided by a central chilled water plant and is pumped to the SZ AHUs serving the dining room. A central steam plant provides steam to a steam-to-hot water converter in the basement mechanical room. The steam-to-hot water converter provides hot water to the H&Vs and the SZ AHUs.

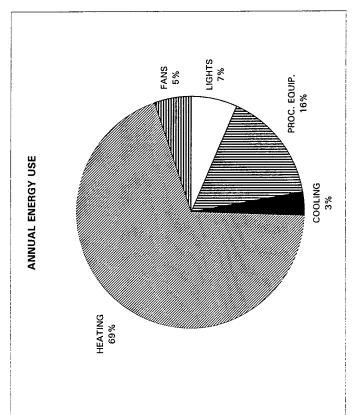
Existing Baseline Energy Consumption

The baseline energy use for the Mess Hall, reported from the BEACON energy analysis program, is presented on the following page.

COOLING	HEATING	FANS		
				1
	/kWh	\$74.22 /kW/yr	\$5.30 /MBtu	
	\$0.0250 /kWh	\$74.22	\$5.30	
SY UNIT COSTS				
3Y UNIT	ity	Demand	Gas	

DEMAND (kW) 12.19	NATURAL GAS (MBtu)	ENERGY USE (MBtu)	ENERGY COST (\$)	DEMAND	ENERGY	ENERGY
(kW) 12.19	GAS (MBtu)	USE (MBtu)	COST (\$)	COST	1000	
(kW) 12.19	(MBtu)	(MBtu) 275	Đ	-	3	COST
12.19		275		€	9	Đ
10.07			2,017	902	0	2,922
70.01		631	4,623	1,141	0	5,764
10.07		133	975	747	0	1,722
	2,815.0	2,815	0	0	14,920	14,920
6.57		216	1,580	487	0	2,068
44.2	2,815	4,070	9,195	3,281	14,920	27,395
	6.57	4	2,815	2.815 4,070	2,815 4,070 9,195 3	2,815 4,070 9,195 3,281





Energy Savings Analysis

Two building energy baselines were created for the Mess Hall using the BEACON energy analysis program. One baseline was created for the kitchen and the other baseline for the dining room. Energy simulations for ECO-1 and ECO-2 were generated from the baselines to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Mess Hall annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
630A	Baseline	1,888.3	0	-	8.7	-	•	•
(Kitchen)	ECO-1	1,848.8	0	•	8.7	39.5	0.0	0
	ECO-2	1,846.7	0	40	8.7	41.6	0.0	0
630B	Baseline	926.7	39,000	133.1	35.5	-	•	•
(Dining	ECO-1	833.2	36,460	124.4	34.0	93.5	8.7	1.5
Room)	ECO-2	829.5	36,340	124.0	34.0	97.2	9.1	1.5
630	ECO-1					133.0	8.7	1.5
	ECO-2					138.8	9.1	1.5

Results of Energy Savings and Economic Analysis

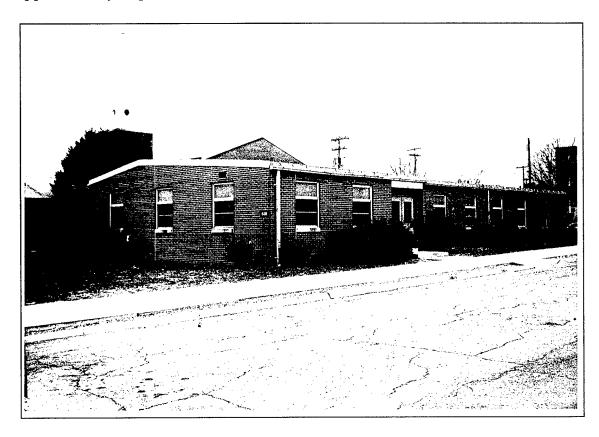
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	8.67	9.08
Annual Electric Demand Savings (kW)	. 1.5	1.5
Annual Natural Gas Savings (MBtu)	133.01	138.84
Total Annual Cost Savings	\$880	\$914
Investment Cost	\$54,215	\$55 <i>,</i> 748
Savings-to-Investment Ratio (SIR)	0.27	0.28
Simple Payback (yrs)	61.62	61.01

5.6 BUILDING 638 (ADMINISTRATION)

Description of Existing Conditions

Building 638 is a 3,700 sq ft one-story building built in 1956. The building was originally a medical clinic, and has recently been converted to an administration office. The building is occupied from 0730 to 1630 hours on Mondays through Fridays. The administrative facility has approximately 10 personnel.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on a metal roof deck, ceiling air space, 6 in. of fiberglass batt insulation, and a ceiling consisting of a combination of acoustic ceiling tile and plaster. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior office areas have a variety of storage cabinets and tables along the exterior walls. The walls are a combination of painted concrete masonry block and ceramic tile block. The windows have adjustable venetian blinds for window shades.

The lighting in the office areas is provided by 40 watt fluorescent lamps with standard ballasts; lighting in the foyers, toilets, and storage closets is provided by a variety of incandescent lamps.

Building 638 is heated and cooled by a three zone multizone air handling unit (MZU). Cooling is provided by an air-cooled condensing unit serving the MZU. A central steam plant provides steam heat to the MZU.

Existing Baseline Energy Consumption

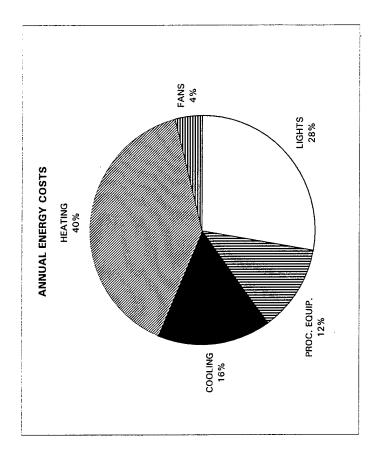
The baseline energy use for Building 638, reported from the BEACON energy analysis program, is presented on the following page.

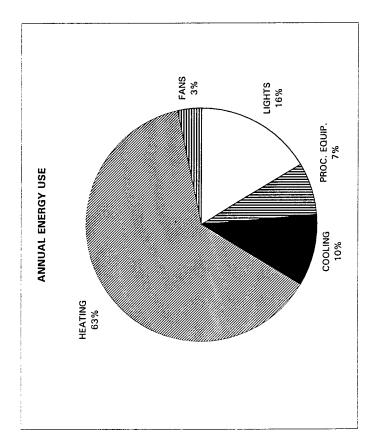
Bldg. No.:
31dg. Name: Admin. Bldg.

Conditioned Floor Area (Sq Ft):	3,327
Bldg. Energy Use (Btu/Sq Ft):	170,793

	\$0.0250 /kWh	\$74.22 /kW/yr	\$5.30 /MBtu
ENERGY UNIT COSTS	Electricity	Electric Demand	Natural Gas

		PEAK		TOTAL	ELECTRIC	ELECTRIC	NAT. GAS	TOTAL
		ELECTRIC	NATURAL	ENERGY	ENERGY	DEMAND	ENERGY	ENERGY
	ELECTRICITY	DEMAND	GAS	USE	COST	COST	COST	COST
ITEM	(kWh)	(kW)	(MBtu)	(MBtu)	(\$)	€	•	(2)
LIGHTS	27,290	8.76		93	682	929	0	1,332
PROC. EQUIP.	11,811	3.79		40	295	281	0	577
COOLING	16,670	4.98		57	417	370	0	787
HEATING			358.9	359	0	0	1,902	1,902
FANS	5,560	0.67		19	139	50	0	189
						The state of the s		
TOTAL	61,331	18.2	329	268	1,533	1,351	1,902	4,786





Energy Savings Analysis

The building energy baseline was created for Building 638 using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to •MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)		Peak Electric Demand Savings (kW)
638	Baseline	358.9	16,670	56.9	18.2	•	-	•
	ECO-1	325.8	15,130	51.6	18.2	33.1	5.3	0
	ECO-2	324.1	15,040	51.3	18.2	34.8	5.6	0

Results of Energy Savings and Economic Analysis

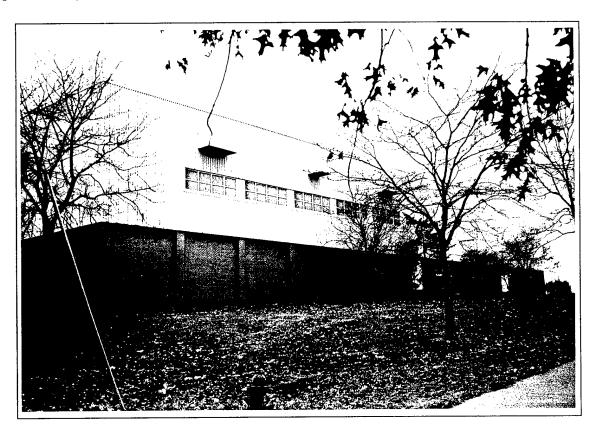
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	5.26	5.56
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	33.13	34.81
Total Annual Cost Savings	\$214	\$225
Investment Cost	\$21,565	\$21,836
Savings-to-Investment Ratio (SIR)	0.17	0.18
Simple Payback (yrs)	100.72	96.95

5.7 BUILDING 826 (GYMNASIUM)

Description of Existing Conditions

Building 826 is a 20,425 sq ft one-story building built in 1956. The building includes athletic facilities like a basketball court, weight room, two handball courts, and locker rooms. The Gymnasium is open from 0530 to 2000 hours on Mondays through Fridays and from 1300 to 2000 on Saturdays and Sundays. Five military personnel manage the facility and serve approximately 200 people per day.



The building wall construction consists of 4 in. face brick, air space, and 6 in. concrete masonry block on the lower portion of the wall and insulated metal panel on the upper portion of the wall. The roof construction is a built-up roof on 2 in. of rigid insulation, a 2 in. poured gypsum roof deck, and 1 in. form board. The windows are clear double pane glass in aluminum frames and vertical sliders. Most of the windows have been replaced with insulated metal panels.

The athletic facilities in the Gymnasium have unique equipment and furnishings that would impact the installation of insulation on walls. The basketball court area has folding bleachers along the entire north wall. Five movable basketball hoops are attached to the exterior walls, two on each of the north and south walls and one on the west wall. A scoreboard is mounted on the west wall. The lower portion of the walls are painted

concrete masonry block, while the upper portion of the walls are painted metal panels. The weight room contains several types of weight lifting equipment and has interior walls similar to the basketball court area walls. The handball court walls are covered with a hard wood surface. The locker rooms have a combination of painted concrete masonry block and ceramic tile block the interior surface of walls.

The lighting in the basketball court area is provided by 75 watt mercury vapor lamps. The lighting for the weight room and handball courts is provided by 35 watt high pressure sodium lamps. The lighting in the locker rooms, foyer, toilets, and storage closets is provided by 34 watt fluorescent lamps with standard ballasts and 60 watt incandescent lamps.

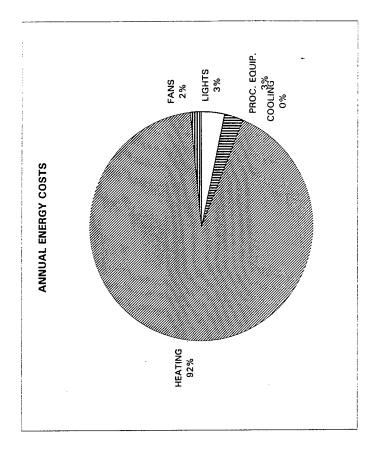
The Gymnasium is heated by five heating and ventilating units (H&Vs). The locker rooms and foyer have steam unit heaters for auxiliary heat. A central steam plant provides steam heat to the H&Vs and unit heaters. The Gymnasium does not have cooling.

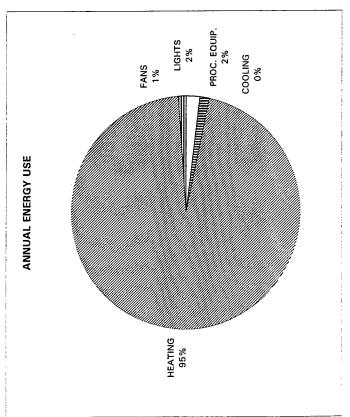
Existing Baseline Energy Consumption

The baseline energy use for the Gymnasium, reported from the BEACON energy analysis program, is presented on the following page.

Bldg. No.: Bldg. Name:	826 Gymnasium		
Conditioned Floor Area (Sq Ft): Bldg. Energy Use (Btu/Sq Ft):	Area (Sq Ft): itu/Sq Ft):	19,827	
ENERGY UNIT COSTS	OSTS		
Electricity		\$0.0250 /kWh	/kWh
Electric Demand		\$74.22 /kW/yı	/kw/3
Natural Gas		\$5.30	\$5.30 /MBtu

		PEAK		TOTAL	ELECTRIC	ELECTRIC	NAT. GAS	TOTAL
		ELECTRIC	NATURAL	ENERGY	ENERGY	DEMAND	ENERGY	ENERGY
	ELECTRICITY	DEMAND	GAS	USE	COST	COST	COST	COST
ITEM	(kWh)	(kW)	(MBtu)	(MBtu)	€	•	€	•
LIGHTS	48,980	5.56		167	1,225	413	0	1,637
PROC. EQUIP.	41,028	4.66		140	1,026	346	0	1,372
COOLING	0	00.0		0	0	0	0	0
HEATING			8,464.2	8,464	0	0	44,860	44,860
FANS	27,860	1.88		95	269	139	0	836
								M
TOTAL	117,868	12.1	8,464.2	8,867	2,947	868	44,860	48,705





Energy Savings Analysis

The building energy baseline was created for the Gymnasium using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
826	Baseline	8,464.2	0	-	12.1	-	-	-
	ECO-1	8,303.9	0	-	12.1	160.3	0.0	0
	ECO-2	8,297.3	0	_	12.1	167.0	0.0	0

Results of Energy Savings and Economic Analysis

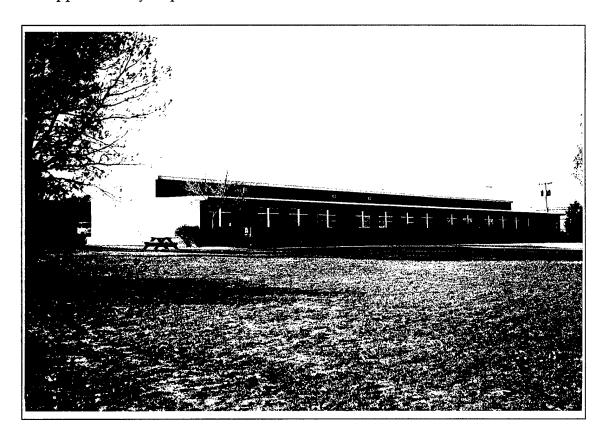
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	0	0
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	160.33	166.97
Total Annual Cost Savings	\$850	\$885
Investment Cost	\$129,351	\$139,097
Savings-to-Investment Ratio (SIR)	0.12	0.11
Simple Payback (yrs)	152.22	157.18

5.8 BUILDING 655 (ADMINISTRATION & SUPPLY)

Description of Existing Conditions

Building 655 is a 12,134 sq ft one-story building built in 1958. The Administration and Supply building is divided into five units, one unit for each military company. Each unit has an administrative area with five offices and a supply area with an arms vault and storage. The building is occupied from 0800 to 1700 hours on Mondays through Fridays and has approximately 40 personnel.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on 2 in. of rigid insulation, a metal roof deck, a ceiling air space, a hardboard ceiling, a ceiling space, and acoustic tile ceiling in the administration area. The roof construction in the supply area does not have ceiling tile, but has 6 in. of fiberglass batt insulation instead. The windows are clear, double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior of the administration areas have walls covered with a decorative jute wall covering. The windows have adjustable venetian blinds for window shades. The interior of the supply areas have painted concrete masonry block walls and a variety of storage containers, cabinets, and metal wire cages.

The lighting is provided by 40 watt fluorescent lamps with standard ballasts throughout the building, except for hallways, foyers, and toilets where lighting is provided by 60 watt and 100 watt incandescent lamps.

The Administration and Supply building is heated throughout by finned-tube baseboard radiation units. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the finned-tube baseboard radiation units.

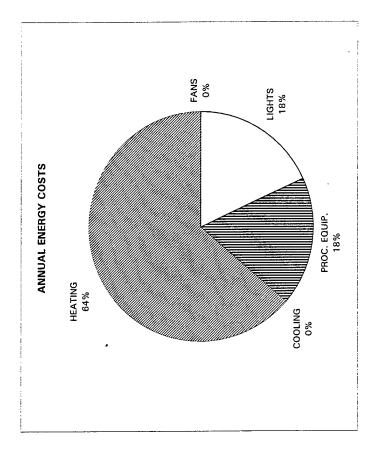
Existing Baseline Energy Consumption

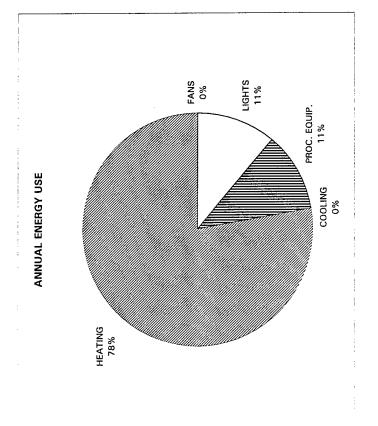
The baseline energy use for the Administration and Supply building, reported from the BEACON energy analysis program, is presented on the following page.

Diag. No.:	660	
Bldg. Name:	Administration/Supply	
Conditioned Floor Area (Sq Ft):	Area (Sq Ft):	11,861
Bldg. Energy Use (Btu/Sq Ft):	Btu/Sq Ft):	99,615

ENERGY UNIT COSTS		
Electricity	\$0.0250 /kWh	/kWh
Electric Demand	\$74.22	\$74.22 /kW/yr
Natural Gas	\$5.30	\$5.30 /MBtu

7,635	4,866	839	1,930	1,182	918.1	11.3	77,207	TOTAL
0	0	0	0	0		00.0	0	FANS
4,866	4,866	0	0	918	918.1			HEATING
0	0	0	0	0		00.0	0	COOLING
1,385	0	419	965	132		5.65	38,617	PROC. EQUIP.
1,384	0	419	965	132		5.65	38,590	LIGHTS
(\$)	(\$)	(\$)	(\$)	(MBtu)	(MBtu)	(kW)	(kWh)	ITEM
COST	COST	COST	COST	USE	GAS	DEMAND	ELECTRICITY	
ENERGY	ENERGY	DEMAND	ENERGY	ENERGY	NATURAL	ELECTRIC		
TOTAL	NAT. GAS	ELECTRIC	ELECTRIC	TOTAL		PEAK		





Energy Savings Analysis

The building energy baseline was created for the Administration and Supply building using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Administration and Supply building annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
655	Baseline	918.1	0	-	11.3	-	-	•
	ECO-1	795.7	0	No.	11.3	122.4	0.0	0
	ECO-2	790.2	0	-	11.3	127.9	0.0	0

Results of Energy Savings and Economic Analysis

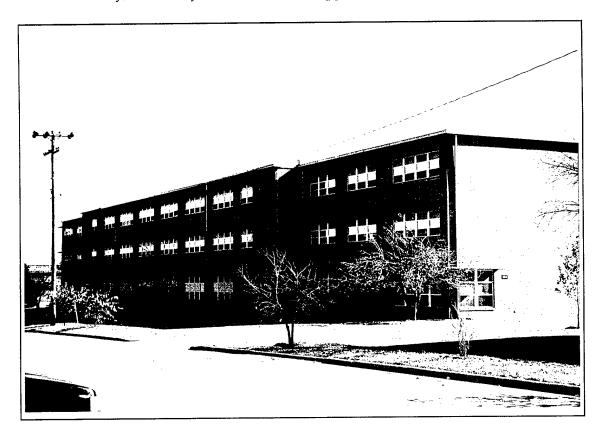
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	0	0
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	122.39	127.89
Total Annual Cost Savings	\$649	\$678
Investment Cost	\$50,994	\$52,484
Savings-to-Investment Ratio (SIR)	0.23	0.23
Simple Payback (yrs)	78.61	77.43

5.9 BUILDING 651 (BARRACKS WITH A/C)

Description of Existing Conditions

Building 651 is a 40,990 sq ft three-story building built in 1957. The barracks building is open 24 hours a day, seven days a week, and has approximately 125 occupants.



The building wall construction is 4 in. face brick, air space, and a combination of 4 in. and 9 in. concrete masonry block. The roof construction is a built-up roof on 2 in. of rigid insulation and a 7 in. concrete roof deck. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior walls are painted concrete masonry block, with the exception of the latrines, laundry, and stairwells where the walls are a combination of painted concrete masonry block and ceramic tile block. The windows do not have shades, but have a plastic film applied to them to obscure the light.

The lighting is provided by 34 watt fluorescent lamps with standard ballasts throughout the building, except for the latrines and storage closets where lighting is provided by 60 watt incandescent lamps.

The barracks building is heated throughout by finned-tube baseboard radiation units. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the finned-tube baseboard radiation units. The barracks building is cooled by two variable air volume air handling units (VAV AHUs). The VAV AHUs were installed in 1974 as part of a barracks modernization program. Cooling is provided by a central chilled water plant and is pumped to the VAV AHUs serving the barracks.

Existing Baseline Energy Consumption

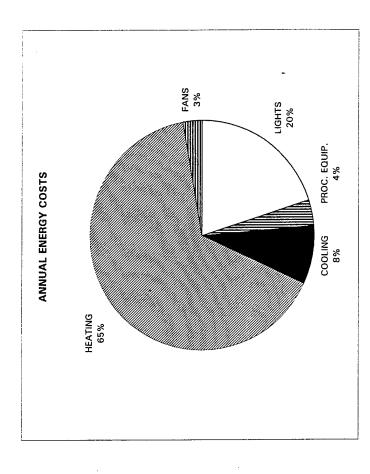
The baseline energy use for the barracks building, reported from the BEACON energy analysis program, is presented on the following page.

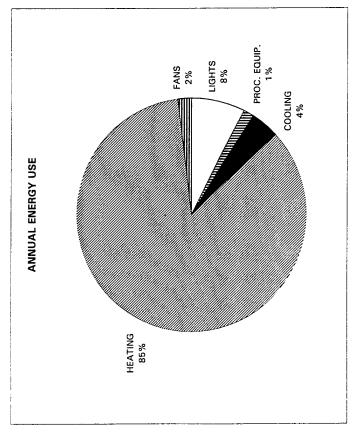
ANNUAL BASELINE ENERGY USE

Bldg. No.: 651 Bldg. Name: Barracks, with A/C Conditioned Floor Area (Sq Ft): 40,990 Bldg. Energy Use (Btu/Sq Ft): 107,585

Electricity \$0.0250 /kWh
Electric Demand \$74.22 /kW/yr
Natural Gas \$5.30 /MBtu

		PEAK		TOTAL	ELECTRIC	ELECTRIC	NAT. GAS	TOTAL
		ELECTRIC	NATURAL	ENERGY	ENERGY	DEMAND	ENERGY	ENERGY
	ELECTRICITY	DEMAND	GAS	OSE	COST	COST	COST	COST
ITEM	(kWh)	(kW)	(MBtu)	(MBtu)	£	€	9	•
LIGHTS	000'26	49.53		331	2,425	3,676	0	6,101
PROC. EQUIP.	17,633	00.6		09	441	899	0	1,109
COOLING	52,400	15.58		179	1,310	1,157	0	2,467
HEATING			3,754.2	3,754	0	0	19,897	19,897
FANS	24,960	2.99		85	624	222	0	846
TOTAL	191,993	77.1	3,754.2	4,409	4,800	5,722	19,897	30,419





Energy Savings Analysis

The building energy baseline was created for the barracks building using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The barracks building annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)		Peak Electric Demand Savings (kW)
651	Baseline	3,754.2	52,400	178.8	77.1	-	-	-
	ECO-1	3,418.9	47,060	160.6	72.6	335.3	18.2	4.5
<u> </u>	ECO-2	3,399.5	46,740	159.5	72.4	354.7	19.3	4.7

Results of Energy Savings and Economic Analysis

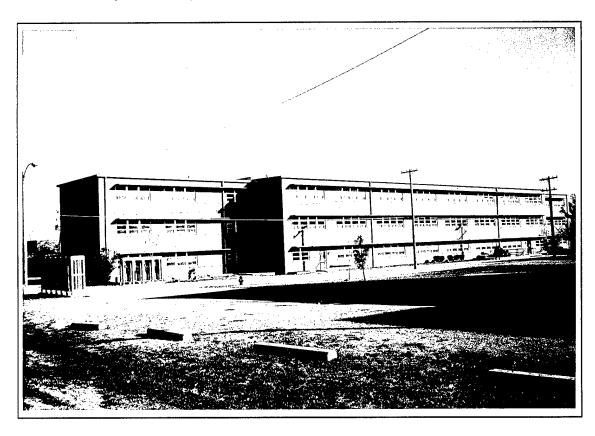
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	18.23	19.32
Annual Electric Demand Savings (kW)	4.5	4.7
Annual Natural Gas Savings (MBtu)	335.28	354.66
Total Annual Cost Savings	\$2,245	\$2,370
Investment Cost	\$176,620	\$181,928
Savings-to-Investment Ratio (SIR)	0.21	0.22
Simple Payback (yrs)	78.69	76.76

5.10 BUILDING 730 (BARRACKS WITHOUT A/C)

Description of Existing Conditions

Building 730 is a 40,640 sq ft three-story building built in 1957. The barracks building is open 24 hours a day, seven days a week, and has approximately 125 occupants.



The building wall construction is 4 in. face brick, air space, and a combination of 4 in. and 9 in. concrete masonry block. The roof construction is a built-up roof on 2 in. of rigid insulation and a 7 in. concrete roof deck. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior walls are painted concrete masonry block, with the exception of the latrines, laundry, and stairwells where the walls are a combination of painted concrete masonry block and ceramic tile block. The windows do not have shades, but have a plastic film applied to them to obscure the light.

The lighting is provided by 34 watt fluorescent lamps with standard ballasts throughout the building, except for the latrines and storage closets where lighting is provided by 60 watt incandescent lamps.

The barracks building is heated throughout by finned-tube baseboard radiation units. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the finned-tube baseboard radiation units. The barracks building does not have cooling.

Existing Baseline Energy Consumption

The baseline energy use for the barracks building, reported from the BEACON energy analysis program, is presented on the following page.

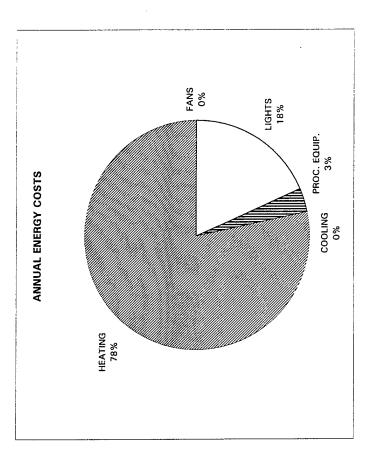
ANNUAL BASELINE ENERGY USE

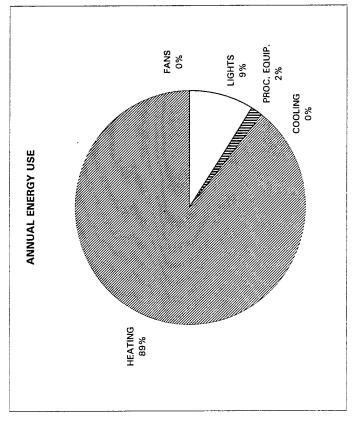
Bldg. No.: 730 Bldg. Name: Barracks, w/o A/C

Conditioned Floor Area (Sq Ft): 40,640 Bldg. Energy Use (Btu/Sq Ft): 83,962 ENERGY UNIT COSTS

Electricity \$0.0250 /kWh
Electric Demand \$74.22 /kWy

			PEAK		TOTAL	ELECTRIC	ELECTRIC	NAT. GAS	TOTAL
			ELECTRIC	NATURAL	ENERGY	ENERGY	DEMAND	ENERGY	ENERGY
		ELECTRICITY	DEMAND	GAS	USE	COST	COST	COST	COST
	ITEM	(kWh)	(kW)	(MBtu)	(MBtu)	9	€	•	જ
	LIGHTS		21.10		307	2,249	1,566	0	3,815
	PROC. EQUIP.	17,633	3.10		09	441	230	0	671
	COOLING	0	00:0		0	0	0	0	0
Λh	HEATING			3,074	3,074	0	0	16,293	16,293
	FANS	0	00.00		0	0	0	0	0
_									
									:
	TOTAL	107,583	24.2	3,074	3,441	2,690	1,796	16,293	20,778
			-						





Energy Savings Analysis

The building energy baseline was created for the barracks building using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The barracks building annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
730	Baseline	3,074.1	0	-	24.2	-	•	-
	ECO-1	2,812.4	0	-	24.2	261.7	0.0	0
	ECO-2	2,795.2	0	-	24.2	278.9	0.0	0

Results of Energy Savings and Economic Analysis

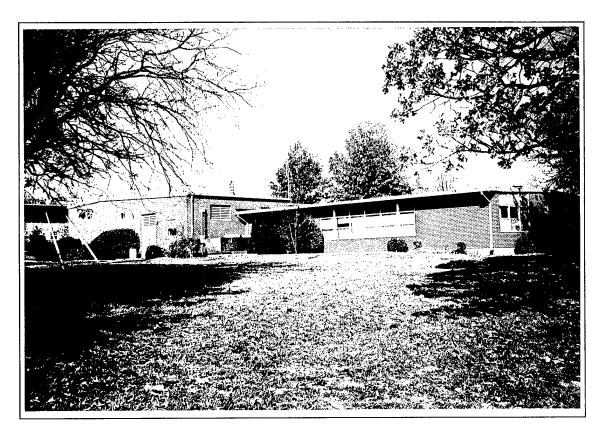
The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	0	0
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	261.73	278.90
Total Annual Cost Savings	\$1,387	\$1,47 8
Investment Cost	\$178,577	\$183,884
Savings-to-Investment Ratio (SIR)	0.14	0.14
Simple Payback (yrs)	128.73	124.40

5.11 BUILDING 625 (BATTALION HEADQUARTERS)

Description of Existing Conditions

Building 625 is a 6,163 sq ft one-story building built in 1963. The Battalion Headquarters has administrative offices and classrooms with approximately 50 personnel using the facility daily. The building is occupied from 0700 to 1700 hours on Mondays through Fridays, and has three assigned personnel from 0800 to 1600 on Saturdays and Sundays.



The building wall construction is 4 in. face brick, air space, and 6 in. concrete masonry block. The roof construction is a built-up roof on 1 in. of rigid insulation, a metal roof deck, ceiling air space, 6 in. of fiberglass batt insulation, and acoustic ceiling tile. The windows are clear double pane glass in aluminum frames, vertical sliders, and have insulated metal panels in the top one-third of the frames.

The interior office and classroom area walls are painted concrete masonry block. The office areas have miscellaneous storage cabinets and shelves along the walls. The classroom has wall-mounted television sets along the west wall and a pull-down movie screen along the south wall. The windows in the office area have cloth draperies for window shades; and the windows in the classroom have adjustable venetian blinds for window shades.

The lighting in the office areas and classroom is provided by 34 watt fluorescent lamps with standard ballasts; lighting in the latrines and storage closets is provided by 60 watt incandescent lamps.

The Battalion Headquarters is heated and cooled a five zone multizone air handling unit (MZU). It is also heated by finned-tube baseboard radiation units. Cooling is provided by an air-cooled condensing unit. A central steam plant provides steam to a steam-to-hot water converter in the mechanical room. The steam-to-hot water converter provides hot water to the MZU and the finned-tube baseboard radiation units.

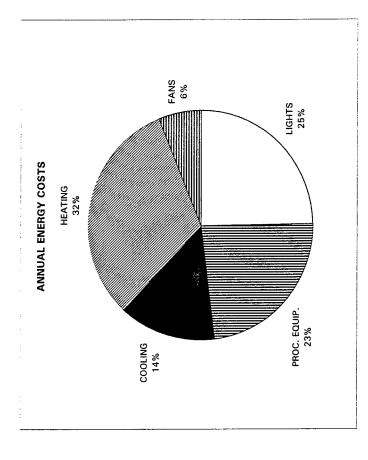
Existing Baseline Energy Consumption

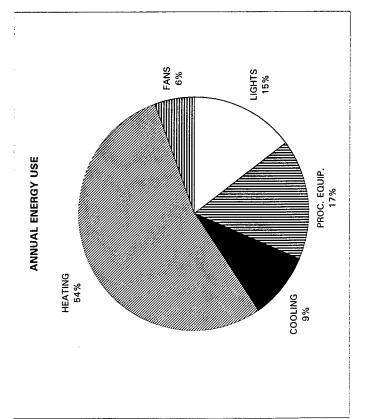
The baseline energy use for the Battalion Headquarters, reported from the BEACON energy analysis program, is presented on the following page.

ANNUAL BASELINE ENERGY USE

Bldg. No.: 625 Bldg. Name: Battalion HQ Conditioned Floor Area (Sq Ft): 5,795 Bldg. Energy Use (Btu/Sq Ft): 153,870

8,007	2,550	2,449	3,008	892	481.1	33.0	120,308	TOTAL
-								
464	0	131	364	20		1.76	14,550	FANS
2,550	2,550	0	0	481	481.1			HEATING
1,123	0	530	593	81		7.14	23,720	COOLING
1,869	0	782	1,087	148		10.53	43,498	PROC. EQUIP.
1,971	0	1,007	964	132			38,540	LIGHTS
9	€	(\$)	(\$)	(MBtu)	(MBtu)	(kW)	(kWh)	ITEM
COST	COST	COST	COST	USE	GAS	DEMAND	ELECTRICITY	
ENERGY	ENERGY	DEMAND	ENERGY	ENERGY	NATURAL	ELECTRIC		
TOTAL	NAT. GAS	ELECTRIC	ELECTRIC	TOTAL		PEAK		





Energy Savings Analysis

The building energy baseline was created for the Battalion Headquarters using the BEACON energy analysis program. Energy simulations for ECO-1 and ECO-2 were generated from the baseline to analyze the addition of fiberglass batt wall insulation and rigid wall insulation, respectively.

The annual energy savings were calculated by subtracting the energy use of the ECOs from the baseline. The Battalion Headquarters annual energy savings for ECO-1 and ECO-2 are presented in the following table.

Bldg. No.	Computer Simulation	Annual Heating (MBtu)	Annual Cooling (kWh)	Annual Cooling (Convert kWh to MBtu)	Peak Electric Demand (kW)	Annual Heating Savings (MBtu)	Annual Cooling Savings (MBtu)	Peak Electric Demand Savings (kW)
625	Baseline	481.1	23,720	81.0	33.0	-	-	-
	ECO-1	413.6	21,580	73.7	33.0	67.5	7.3	0
	ECO-2	410.6	21,450	73.2	33.0	70.5	7.7	0

One building in this group had significant differences in interior furnishings and equipment, requiring separate construction costs in addition to the representative building construction costs. This building and its significant difference is noted as follows:

Building 631 (Data Processing Center - formerly a Battalion Headquarters) Computer processing equipment and fire suppression systems require relocation.

Results of Energy Savings and Economic Analysis

The energy savings and economic analysis for ECO-1 and ECO-2 are presented in Appendix D. The results of the analysis are summarized in the table below.

Item	ECO-1	ECO-2
Annual Electric Energy Savings (MBtu)	. 7.30	7.7 5
Annual Electric Demand Savings (kW)	0	0
Annual Natural Gas Savings (MBtu)	67.50	70.48
Total Annual Cost Savings	\$411	\$430
Investment Cost	\$37,132	\$38,019
Savings-to-Investment Ratio (SIR)	0.19	0.20
Simple Payback (yrs)	90.30	88.35

6. SUMMARY AND RECOMMENDATIONS

6.1 SUMMARY

The 100 buildings in this study were divided into ten groups on the basis of similar building use and function, with one representative building designated per group. The ten representative buildings were evaluated for two energy conservation opportunities (ECOs) each. ECO-1 represents the installation of fiberglass batt wall insulation, and ECO-2 represents the installation of rigid wall insulation. Energy savings, construction costs, and life cycle cost analyses (LCCAs) were calculated for each ECO.

The annual energy savings for the representative buildings were extrapolated to similar buildings in each building group. The extrapolation was performed on a square foot basis. Likewise, the construction costs were extrapolated to similar buildings in each building group.

Building 1026, a Branch PX, was built in 1985. Its wall insulation consists of 8 inch concrete masonry blocks with loose fill insulation in the cores and 2.5 inches of rigid insulation. The roof construction includes 4 inches of rigid insulation. Building 1026 was eliminated from the energy analysis because the insulation in the walls and roof well exceed the optimum thicknesses for insulation.

The economic summary for ECO-1 and ECO-2 is presented in Table 6-1 beginning on page 6-2. This table ranks the ECOs from highest to lowest savings-to-investment ratio (SIR). The highest SIR calculated is 0.47 with a 35.5 year Simple Payback for Building 637, a Chapel building.

6.2 RECOMMENDATIONS

The ECOs presented in Table 6-1 have SIRs less than 1.25 and Simple Paybacks greater than 10 years. These ECOS do not qualify for funding under the Energy Conservation Implementation Program (ECIP) and, therefore, are not recommended for implementation.

TABLE 6-1 ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

				MAT GAS	<u>.</u>	TOTAL	Ü	TAN	<u>.</u>	ELEC.	TOTAL				
				ENERGY	ENERGY	ENERGY	DEMAND	COST	COST	COST	COST	TOTAL		SIMPLE	
BLDG NO.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	SAVINGS (MBtu/vr)	SAVINGS	SAVINGS	SAVINGS	SAVINGS (\$/vr)	SAVINGS (\$/vr)	SAVINGS (\$/vr)	SAVINGS	INVESTMENT	DISCOUNTED SAVINGS (\$)	PAYBACK	<u>a</u>
637	Chapel	8,949	EC0 1	229.45	35.97	265.42	2.70	\$1,216	\$263	\$200	\$1,680	\$59,688	\$27,931	35.53	0.47
742	Chapel	8,949	ECO 1	229.45	35.97	265.42	2.70	\$1,216	\$263	\$200	\$1,680	\$59,688	\$27,931	35.53	0.47
843	Chapel	8,890	ECO 1	227.94	35.74	263.67	2.68	\$1,208	\$262	\$199	\$1,669	\$59,295	\$27,747	35.53	0.47
637	Chapel	8,949	ECO 2	232.76	37.24	270.00	2.80	\$1,234	\$273	\$208	\$1,714	\$63,708	\$28,470	37.17	0.45
742	Chapel	8,949	ECO 2	232.76	37.24	270.00	2.80	\$1,234	\$273	\$208	\$1,714	\$63,708	\$28,470	37.17	0.45
843	Chapel	8,890	ECO 2	231.23	36.99	268.22	2.78	\$1,225	\$271	\$206	\$1,703	\$63,288	\$28,282	37.17	0.45
639	Branch PX	5,413	ECO 1	49.11	8.26	57.37	1.30	\$260	\$60	96\$	\$417	\$22,547	\$6,757	54.04	0.30
835	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	\$300	\$70	\$111	\$481	\$25,992	\$7,789	54.04	0.30
835	Branch PX	6,240	EC0 2	60.00	10.27	70.27	1.50	\$318	\$75	\$111	\$504	\$28,015	\$8,183	55.54	0.29
639	Branch PX	5,413	ECO 2	52.05	8.91	96.09	1.30	\$276	\$65	96\$	\$438	\$24,302	660'2\$	55.54	0.29
630	Mess Hall	13,280	ECO 2	138.84	80.6	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
632	Mess Half	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
653	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
657	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
735	Mess Hall	13,280	ECO 2	138.84	90.6	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
739	Mess Hall	13,280	EC02	138.84	80.6	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
749	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
754	Mess Hall	13,280	ECO 2	138.84	9.08	147.92	1.50	\$736	99\$	\$111	\$914	\$55,748	\$15,485	61.02	0.28
820	Mess Hall	13,280	EC0 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
821	Mess Hall	13,280	EC0 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
836	Mess Hall	13,280	EC0 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
837	Mess Hall	13,280	EC0 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
1010	Mess Hall	13,280	EC02	138.84	9.08	147.92	1.50	\$736	99\$	\$111	\$914	\$55,748	\$15,485	61.02	0.28
1011	Mess Hail	13,280	EC0 2	138.84	9.08	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
1027	Mess Hall	13,280	EC0 2	138.84	90.6	147.92	1.50	\$736	\$66	\$111	\$914	\$55,748	\$15,485	61.02	0.28
930	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
632	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
653	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
657	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
735	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
739	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
749	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
754	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
820	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
821	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
836	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
837	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
1010	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
1011	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27
1027	Mess Hall	13,280	ECO 1	133.01	8.67	141.68	1.50	\$705	\$63	\$111	\$880	\$54,215	\$14,895	61.63	0.27

TABLE 6-1 ECONOMIC SUMMARY OF ECOS - RANKED BY SIR

															1
				NAT. GAS	ELEC.	TOTAL	ELEC.	NAT. GAS	ELEC.	ELEC. DEMAND	TOTAL ENERGY				
BLDG		BUILDING		ENERGY SAVINGS	SAVINGS	ENERGY SAVINGS	DEMAND	SAVINGS	SAVINGS	SAVINGS	SAVINGS	TOTAL	DISCOUNTED	SIMPLE	
Š.	BLDG NAME	AREA (SF)	ECO NO.	(MBtu/yr)	(MBtu/yr)	(MBtu/yr)	(kW)	(\$/yr)	(\$/yr)	(\$/yr)	(\$/yr)	9	SAVINGS (\$)	(yrs)	SIR
744	Branch PX	6,240	ECO 1	56.61	9.52	66.13	1.50	\$300	\$70	\$111	\$481	\$29,219	\$7,789	60.75	0.27
744	Branch PX	6,240	ECO 2	60.00	10.27	70.27	1.50	\$318	\$75	\$111	\$504	\$30,958	\$8,183	61.38	0.26
626	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	0\$	\$0	629\$	\$52,575	\$12,059	77.43	0.23
733	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
734	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	0\$	\$679	\$52,575	\$12,059	77.43	0.23
751	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
752	Administration/Supply	12,155	EC0 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
823	Administration/Supply	12,155	EC0 2	128.11	0.00	128.11	0.00	\$679	0\$	\$0	\$679	\$52,575	\$12,059	77.43	0.23
824	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	0\$	0\$	\$679	\$52,575	\$12,059	77.43	0.23
840	Administration/Supply	12,155	EC0 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
841	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
1006	Administration/Supply	12,155	EC0 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
1007	Administration/Supply	12,155	ECO 2	128.11	0.00	128.11	0.00	629\$	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
1025	Administration/Supply	12,155	EC0 2	128.11	0.00	128.11	0.00	\$679	\$0	\$0	\$679	\$52,575	\$12,059	77.43	0.23
633	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	\$678	\$0	\$0	\$678	\$52,484	\$12,038	77.43	0.23
655	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	\$678	\$0	\$0	\$678	\$52,484	\$12,038	77.43	0.23
656	Administration/Supply	12,134	ECO 2	127.89	0.00	127.89	0.00	\$678	\$0	\$0	\$678	\$52,484	\$12,038	77.43	0.23
929	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
733	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
734	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
751	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
752	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
823	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
824	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
840	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
841	Administration/Supply	12,155	ECO 1	122.60	00.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
1006	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	\$0	\$650	\$51,082	\$11,540	78.61	0.23
1007	Administration/Supply	12,155	ECO 1	122.60	0.00	122.60	0.00	\$650	\$0	0\$	\$650	\$51,082	\$11,540	78.61	0.23
1025	Administration/Supply	12,155	ECO 1	122.60	00.00	122.60	0.00	\$650	\$0	OŞ.	\$650	\$51,082	\$11,540	78.61	0.23
633	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	\$649	S S	\$	\$649	\$50,994	\$11,520	78.61	0.23
655	Administration/Supply	12,134	EC0 1	122.39	0.00	122.39	0.00	\$649	S,	9	\$649	\$50,994	\$11,520	78.61	0.23
656	Administration/Supply	12,134	ECO 1	122.39	0.00	122.39	0.00	\$649	\$0	\$0	\$649	\$50,994	\$11,520	78.61	0.23
627	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
628	Barracks, with A/C	40,640	EC0 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
629	Barracks, with A/C	40,640	EC02	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
634	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
635	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
651	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
652	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
654	Barracks, with A/C	40,990	ECO 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22

TABLE 6-1 ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

				NAT GAS	<u> </u>	TOTAL	Ü	NAT GAS	ū	ELEC.	TOTAL				<i>~~c</i>
		,		ENERGY	ENERGY	ENERGY	DEMAND	COST	COST	COST	COST	TOTAL		SIMPLE	-
BLDG.	BLDG NAME	BUILDING AREA (SF)	ECO NO.	SAVINGS (MBtu/vr)	SAVINGS (MBtu/vr)	SAVINGS (MBtu/vr)	SAVINGS	SAVINGS (\$/vr)	SAVINGS (\$/vr)	SAVINGS (\$/vr)	SAVINGS (\$/vr)	INVESTMENT (\$)	DISCOUNTED SAVINGS (\$)	PAYBACK (vrs)	SE
659	Barracks, with A/C	40,990	EC0 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
099	Barracks, with A/C	40,990	EC0 2	354.66	19.32	373.98	4.70	\$1,880	\$141	\$349	\$2,370	\$181,928	\$40,034	76.76	0.22
1012	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1013	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1014	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1015	Barracks, with A/C	40,640	EC0 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1016	Barracks, with A/C	40,640	ECO 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1028	Barracks, with A/C	40,640	EC0 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
1029	Barracks, with A/C	40,640	EC0 2	351.63	19.15	370.78	4.66	\$1,864	\$140	\$346	\$2,350	\$180,374	\$39,692	76.76	0.22
627	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
628	Barracks, with A/C	40,640	ECO 1	. 332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
629	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
634	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
989	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
651	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	69'82	0.21
652	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	69'82	0.21
654	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
629	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
099	Barracks, with A/C	40,990	ECO 1	335.28	18.23	353.51	4.50	\$1,777	\$133	\$334	\$2,244	\$176,620	\$37,899	78.69	0.21
1012	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1013		40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1014	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1015	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1016	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1028	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
1029	Barracks, with A/C	40,640	ECO 1	332.42	18.07	350.49	4.46	\$1,762	\$132	\$331	\$2,225	\$175,112	\$37,576	78.69	0.21
625	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
631	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
650	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
658	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
732	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
740	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
750	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
753	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
822	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
825	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
838	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
842		6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
1008	\neg	6,163	ECO 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
1009	Battalion HQ	6,163	EC0 2	70.48	7.75	78.23	0.00	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20

TABLE 6-1 ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

			-	ECONO	ا الا	SUMMARY OF		ECOs -	KANK	- KANKED BY	SIR				
			•	NAT. GAS	ELEC.	TOTAL	ELEC.	NAT. GAS	ELEC.	ELEC. DEMAND	TOTAL				
<u> </u>		BI DING		SAVINGS	ENERGY	ENERGY	DEMAND	COST	COST	COST	COST	TOTAL	Cativio	SIMPLE	
NO.	BLDG NAME	AREA (SF)	ECO NO.	(MBtu/yr)	(MBtu/yr)	(MBtu/yr)	(kW)	(\$fyr)	(\$/yr)	(\$/yr)	(\$/yr)	(\$)	SAVINGS (\$)	(yrs)	SIR
1022	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	00.0	\$374	\$57	0\$	\$430	\$38,019	\$7,417	88.36	0.20
1023	Battalion HQ	6,163	ECO 2	70.48	7.75	78.23	00:0	\$374	\$57	\$0	\$430	\$38,019	\$7,417	88.36	0.20
625	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
631	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	160'2\$	90.30	0.19
920	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
658	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
732	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
740	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	00.0	\$358	\$53	20	\$411	\$37,132	\$7,091	90.30	0.19
750	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
753	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	0\$	\$411	\$37,132	\$7,091	90.30	0.19
822	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	0\$	\$411	\$37,132	\$7,091	90.30	0.19
825	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	20	\$411	\$37,132	\$7,091	90.30	0.19
838	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	80	\$411	\$37,132	\$7,091	90.30	0.19
842	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	00.0	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
1008	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	160'2\$	90.30	0.19
1009	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	160'2\$	90.30	0.19
1022	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
1023	Battalion HQ	6,163	ECO 1	67.50	7.30	74.80	0.00	\$358	\$53	\$0	\$411	\$37,132	\$7,091	90.30	0.19
638	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	\$184	\$41	\$0	\$225	\$21,836	\$3,839	96.95	0.18
743	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	\$184	\$41	\$0 \$	\$225	\$21,836	\$3,839	96.95	0.18
832	Administration Bldg	3,700	ECO 2	34.81	5.56	40.37	0.00	\$184	\$41	\$0	\$225	\$21,836	\$3,839	96.95	0.18
638	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	\$176	\$38	\$0	\$214	\$21,565	\$3,649	100.74	0.17
743	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	\$176	\$38	\$0	\$214	\$21,565	\$3,649	100.74	0.17
832	Administration Bldg	3,700	ECO 1	33.13	5.26	38.39	0.00	\$176	\$38	\$0	\$214	\$21,565	\$3,649	100.74	0.17
230	Barracks, without A/C	40,640	ECO 2	278.90	00.0	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
731	Barracks, without A/C	40,640	ECO 2	278.90	0.0	278.90	0.00	\$1,478	\$0	0\$	\$1,478	\$183,884	\$26,252	124.40	0.14
736	Barracks, without A/C	40,640	ECO 2	278.90	00.0	278.90	00.0	\$1,478	\$0	\$	\$1,478	\$183,884	\$26,252	124.40	0.14
737	Barracks, without A/C	40,640	EC0 2	278.90	00.0	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
738	Barracks, without A/C	40,640	EC02	278.90	800	278.90	0.00	\$1,478	0\$	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
747	Barracks, without A/C	40,640	EC02	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252		0.14
748	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
755	Barracks, without A/C	40,640	ECO 2	278.90	000	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
756	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
757	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
815	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
816	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
817	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
818	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
819	Barracks, without A/C	40,640	EC02	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
827	Barracks, without A/C	40,640	EC0 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14

TABLE 6-1 ECONOMIC SUMMARY OF ECOs - RANKED BY SIR

			4		اد		SOMMAN OF EGGS - NAMINED D	600)) !					
				0 10	i.	4101	Ç L	940	Ç Ü	ELEC.	TOTAL				·
				MAI. GAS	ENERGY	ENERGY	DEMAND	COST	COST	COST	COST	TOTAL		SIMPLE	
BLDG	BLDG NAME	BUILDING AREA (SF)	ECO NO.		SAVINGS (MBtu/vr)	SAVINGS (MBtu/vr)	SAVINGS (kW)	SAVINGS (\$/vr)	SAVINGS (\$/vr)	SAVINGS (\$/vr)	SAVINGS (\$/vr)	INVESTMENT (\$)	DISCOUNTED SAVINGS (\$)	PAYBACK (vrs)	SIR
828	Barracks, without A/C	40.640	ECO 2	1	0.00	278.90	0.00	\$1,478	\$0	O\$	\$1,478	\$183,884	\$26,252	124.40	0.14
829	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	00.0	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
830	Barracks, without A/C	40,640	EC02	278.90	00.0	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
831	Barracks, without A/C	40,640	ECO 2	278.90	0.00	278.90	0.00	\$1,478	\$0	\$0	\$1,478	\$183,884	\$26,252	124.40	0.14
730	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00:0	\$1,387	0\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
731	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	0\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
736	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
737	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	0\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
738	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.0	\$1,387	0\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
747	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	0\$	0\$	\$1,387	\$178,577	\$24,636	128.73	0.14
748	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.0	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
755	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
756	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	0\$	0\$	\$1,387	\$178,577	\$24,636	128.73	0.14
757	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
815	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	0\$	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
816	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
817	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
818	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
819	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
827	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	\$0	O\$	\$1,387	\$178,577	\$24,636	128.73	0.14
828	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
829	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
830	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	0.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
831	Barracks, without A/C	40,640	ECO 1	261.73	0.00	261.73	00.00	\$1,387	\$0	\$0	\$1,387	\$178,577	\$24,636	128.73	0.14
640	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	00.00	\$850	\$0	0\$	\$850	\$129,351	\$15,092	152.22	0.12
746	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	0.00	\$850	\$0	\$0	\$850		\$15,092	152.22	0.12
826	Gymnasium	20,425	ECO 1	160.33	0.00	160.33	00.00	\$850	9	\$0	\$850		\$15,092	152.22	0.12
640	Gymnasium	20,425	EC0 2	166.97	0.00	166.97	00.00	\$885	\$0	\$0	\$885	\$139,097	\$15,717	157.18	0.11
746	Gymnasium	20,425	EC0 2	166.97	0.00	166.97	00.00	\$885	0\$	\$0	\$885		\$15,717	157.18	0.11
826	Gymnasium	20,425	EC0 2	166.97	0.00	166.97	00.00	\$885	\$0	\$0	\$885	\$139,097	\$15,717	157.18	0.11
844	Brigade HQ	9,890	ECO 1	45.94	12.32	58.25	98.0	\$243	\$30	\$64	\$397	\$61,881	\$6,425	155.79	0.10
1018	Brigade HQ	9,890	ECO 1	45.94	12.32	58.25	0.86	\$243	\$30	\$64	\$397	\$61,881		155.79	0.10
636	Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	08.0	\$227	\$84	\$26	\$371	\$57,789		155.79	0.10
741	Brigade HQ	9,236	ECO 1	42.90	11.50	54.40	0.80	\$227	\$84	\$59	\$371	\$57,789	\$6,000	155.79	0.10
844	Brigade HQ	9,890	EC0 2	48.27	12.83	61,10	0.86	\$256	\$94	\$64	\$413		\$6,696	158.19	0.10
1018	Brigade HQ	9,890	EC0 2	48.27	12.83	61.10	0.86	\$256	\$94	\$64	\$413		969'9\$		
636	Brigade HQ	9,236	EC0 2	45.08	11.98	90'25	0.80	\$239	\$88	\$29	\$386		\$6,253		
741	Brigade HQ	9,236	EC02	45.08	11.98	57.06	0.80	\$239	\$88	\$29	\$386	\$61,061	\$6,253	158.19	0.10

APPENDIX A

SCOPE OF WORK, CONFIRMATION NOTICES, CORRESPONDENCE

GENERAL SCOPE OF WORK

FOR A

LIMITED ENERGY STUDY

INSULATING BRICK BUILDINGS

FORT LEONARD WOOD, MISSOURI

Performed as part of the ENERGY ENGINEERING ANALYSIS PROGRAM (EEAP)

SCOPE OF WORK FOR A LIMITED ENERGY STUDY

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 - 5.3 Nonfeasible ECOs
- 6. DETAILED SCOPE OF WORK
- 7. WORK TO BE ACCOMPLISHED
 - 7.1 Perform a Limited Site Survey
 - 7.2 Evaluate Selected ECOs
 - 7.3 Combine ECOs into Recommended Projects
 - 7.4 Submittals, Presentations and Reviews

ANNEXES

- A DETAILED SCOPE OF WORK
- B EXECUTIVE SUMMARY GUIDELINE
- C REQUIRED DD FORM 1391 DATA

- 1. BRIEF DESCRIPTION OF WORK: The Architect-Engineer (AE) shall:
- 1.1 Perform a limited site survey of specific buildings or areas to collect all data required to evaluate the specific ECOs included in this study.
- 1.2 Evaluate specific ECOs to determine their energy savings potential and economic feasibility.
 - 1.3 Provide project documentation for recommended ECOs as detailed herein.
 - 1.4 Prepare a comprehensive report to document all work performed, the results and all recommendations.

2. GENERAL

- 2.1 This study is limited to the evaluation of the specific buildings, systems, or ECOs listed in Annex A, DETAILED SCOPE OF WORK.
- 2.2 The information and analysis outlined herein are considered to be minimum requirements for adequate performance of this study.
- 2.3 For the buildings, systems or ECOs listed in Annex A, all methods of energy conservation which are reasonable and practical shall be considered, including improvements of operational methods and procedures as well as the physical facilities. All energy conservation opportunities which produce energy or dollar savings shall be documented in this report. Any energy conservation opportunity considered infeasible shall also be documented in the report with reasons for elimination.
- 2.4 The study shall consider the use of all energy sources applicable to each building, system, or ECO.
- 2.5 The "Energy Conservation Investment Program (ECIP) Guidance", described in letter from DAIM-FDF-U, dated 10 January 1994 establishes criteria for ECIP projects and shall be used for performing the economic analyses of all ECOs and projects. The program, Life Cycle Cost In Design (LCCID), has been developed for performing life cycle cost calculations in accordance with ECIP guidelines and is referenced in the ECIP Guidance. If any program other than LCCID is proposed for life cycle cost analysis, it must use the mode of calculation specified in the ECIP Guidance. The output must be in the format of the ECIP LCCA summary sheet, and it must be submitted for approval to the Contracting Officer.

- 2.6 Computer modeling will be used to determine the energy savings of ECOs which would significantly change the heatingand cooling loads of an existing HVAC system. The requirement to use computer modeling applies only to heated and air-conditioned or air-conditioned-only buildings which exceed 8,000 square feet or heated-only buildings in excess of 20,000 square feet. Modeling will be done using a professionally recognized and proven computer program or programs that integrate architectural features with air-conditioning, heating, lighting and other energy-producing or consuming systems. These programs will be capable of simulating the features, systems, and thermal loads of the building under study. The program will use established weather data files and may perform calculations on a true hour-by-hour basis or may condense the weather files and the number of calculations into several "typical" days per month. The Detailed Scope of Work, Annex A, will list programs that are acceptable to the Contracting Officer. If the AE desires to use a different program, it must be submitted for approval with a sample run, an explanation of all input and output data, and a of summary program methodology and energy capabilities.
- 2.7 Energy conservation opportunities determined to be technically and economically feasible shall be developed into projects acceptable to installation personnel. This may involve combining similar ECOs into larger packages which will qualify for ECIP or FEMP funding, and determining in coordination with installation personnel the appropriate packaging and implementation approach for all feasible ECOs.
- 2.7.1 Projects which qualify for ECIP funding shall be identified, separately listed, and prioritized by the Savings to Investment Ratio (SIR).
- 2.7.2 All feasible non-ECIP projects shall be ranked in order of highest to lowest SIR.

3. PROJECT MANAGEMENT

Project Managers. The AE shall designate a project manager to serve as a point of contact and liaison for work required under this contract. Upon award of this contract, the individual shall be immediately designated in writing. The AE's designated project manager shall be approved by the Contracting Officer prior to commencement of work. This designated individual shall be responsible for coordination required under this contract. The Contracting Officer will designate a project manager to serve as the Government's point contact and liaison for all work required under This individual contract. will be the Government's representative.

- 3.2 <u>Installation Assistance</u>. The Commanding Officer or authorized representative at the installation will designate an individual to assist the AE in obtaining information and establishing contacts necessary to accomplish the work required under this contract. This individual will be the installation representative.
- 3.3 <u>Fublic Disclosures</u>. The AE shall make no public announcements or disclosures relative to information contained or developed in this contract, except as authorized by the Contracting Officer.
- requested by the AE or the Contracting Officer for the resolution of questions or problems encountered in the performance of the work. The AE's project manager and the Government's representative shall be required to attend and participate in all meetings pertinent to the work required under this contract as directed by the Contracting Officer. These meetings, if necessary, are in addition to the presentation and review conferences.
- 3.5 <u>Site Visits, Inspections, and Investigations</u>. The AE shall visit and inspect/investigate the site of the project as necessary and required during the preparation and accomplishment of the work.

3.6 Records

- The AE shall provide a record of all significant conferences, meetings, discussions, verbal directions, telephone conversations, etc., with Government representative(s) relative designated and/or the AΕ which in contract representative(s) thereof participated. These records shall be dated and shall identify the contract number, and modification number if applicable, participating personnel, subject discussed and conclusions reached. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the records.
- 3.6.2 The AE shall provide a record of requests for and/or receipt of Government-furnished material, data, documents, information, etc., which if not furnished in a timely manner, would significantly impair the normal progression of the work under this contract. The records shall be dated and shall identify the contract number and modification number, if applicable. The AE shall forward to the Contracting Officer within ten calendar days, a reproducible copy of the record of request or receipt of material.
- 3.7 <u>Interviews</u>. The AE and the Government's representative shall conduct entry and exit interviews with the Director of

Public Works before starting work at the installation and after completion of the field work. The Government's representative shall schedule the interviews at least one week in advance.

- 3.7.1 Entry. The entry interview shall describe the intended procedures for the survey and shall be conducted prior to commencing work at the facility. As a minimum, the interview shall cover the following points:
 - a. Schedules.
 - b. Names of energy analysts who will be conducting the site survey.
 - c. Proposed working hours.
 - d. Support requirements from the Director of Public Works.
- 3.7.2 Exit. The exit interview shall briefly describe the items surveyed and probable areas of energy conservation. The interview shall also solicit input and advice from the Director of Public Works.
- 4. <u>SERVICES</u> <u>AND MATERIALS</u>. All services, materials (except those specifically enumerated to be furnished by the Government), plant, labor, supervision and travel necessary to perform the work and render the data required under this contract are included in the lump sum price of the contract.
- 5. PROJECT DOCUMENTATION. All energy conservation opportunities which the AE has considered shall be included in one of the following categories and presented in the report as such:
- 5.1 ECIP Projects. To qualify as an ECIP project, an ECO, several ECOs which have been combined, must have a construction cost estimate greater than \$300,000, a Savings to Investment Ratio greater than 1.25 and a simple payback period of less than ten years. The overall project and each discrete part of the project shall have an SIR greater than 1.25. projects meeting the above criteria shall be arranged as specified in paragraph 2.7.1 and shall be provided with programming documentation. Programming documentation shall consist of a DD Form 1391, life cycle cost analysis (LCCA) summary sheet(s) (with necessary backup data to verify the A life cycle cost analysis summary sheet numbers presented). shall be developed for each ECO and for the overall project when more than one ECO are combined. The energy savings for projects consisting of multiple ECOs must take into account synergistic effects of the individual ECOs.

- Non-ECIP Projects. Projects which do not meet ECIP criteria with regard to cost estimate, payback period, which have an SIR greater than 1.25 shall be documented. Projects or ECOs in this category shall be arranged as specified in paragraph 2.7.2 and shall be provided with the following documentation: the life cycle cost analysis (LCCA) summary sheet completely filled out, a description of the work to be accomplished, backup data for the LCCA, ie, energy savings calculations and cost estimate(s), and the simple payback period. The energy savings for projects consisting of multiple ECOs must take into account the synergistic effects of the individual ECOs. In addition these projects shall have the ъy required prepared, as documentation following the of representative, one for Government's categories:
- a. Federal Energy Management Program (FEMP) Projects. A FEMP (or O&M Energy project is one that results in needed maintenance or repair to an existing facility, or replaces a failed or failing existing facility, and also results in energy savings. The criteria are similar to the criteria for ECIP projects, ie, SIR > 1.25, and simple payback period of less than ten years. Projects with a construction cost estimate up to \$1.000,000 shall be documented as outlined in par 5.2 above; projects over \$1,000,000 shall be documented on 1391s. in the FEMP program, a system may be defined as "failed of failing" if it is efficient or technically obsolete. However, if this strategy is used to justify a proposed project, the equipment to be replaced must have been in use for at least three years.
- b. Low Cost/No Cost Projects. These are projects which the Director of Public Works (DPW) can perform using his resources. Documentation shall be as required by the DPW.
- 5.3 Nonfeasible ECOs. All ECOs which the AE has considered but which are not feasible, shall be documented in the report with reasons and justifications showing why they were rejected.
- 6. <u>DETAILED SCOPE OF WORK</u>. The Detailed Scope of Work is contained in Annex A.

7. WORK TO BE ACCOMPLISHED.

7.1 Perform a Limited Site Survey. The AE shall obtain all necessary data to evaluate the ECOs or projects by conducting a site survey. However, the AE is encouraged to use any data that may have been documented in a previous study. The AE shall document his site survey on forms developed for the survey, or standard forms, and submit these completed forms as part of the report. All test and/or measurement equipment shall be properly calibrated prior to its use.

- 7.2 Evaluate Selected ECOs. The AE shall analyze the ECOs These ECOs shall be analyzed in detail to listed in Annex A. Savings to Investment Ratios determine their feasibility. (SIRs) shall be determined using current ECIP guidance. The AE shall provide all data and calculations needed to support the All assumptions and engineering equations recommended ECO. shall be clearly stated. Calculations shall be prepared showing how all numbers in the ECO were figured. Calculations shall be an orderly step-by-step progression from the first assumption to the final number. Descriptions of the products, manufacturers catalog cuts, pertinent drawings and sketches shall also be included. A life cycle cost analysis summary sheet shall be prepared for each ECO and included as part of the supporting data.
- 7.3 Combine ECOs Into Recommended Projects. During the Interim Review Conference, as outlined in paragraph 7.4.1], the AE will be advised of the DEH's preferred packaging of recommended ECOs into projects for implementation. Some projects may be a combination of several ECOs, and others may contain only one. These projects will be evaluated and arranged as outlined in paragraphs 5.1, 5.2, and 5.3. Energy savings calculations shall take into account the synergistic effects of multiple ECOs within a project and the effects of one project upon another. The results of this effort will be reported in the Final Submittal per par 7.4.2.
- 7.4 Submittals, Presentations and Reviews. The work accomplished shall be fully documented by a comprehensive report. The report shall have a table of contents and shall be indexed. Tabs and dividers shall clearly and distinctly divide sections, subsections, and appendices. All pages shall be numbered. Names of the persons primarily responsible for the project shall be included. The AE shall give a formal presentation of the interim submittal to installation, command, and other Government personnel. Slides or view graphs showing the results of the study to date shall be used during the presentation. During the presentation, the personnel in attendance shall be given ample opportunity to ask questions and discuss any changes deemed necessary to the study. A review conference will be conducted the same day, following the presentation. Each comment presented at the review conference will be discussed and resolved or action items assigned. It is anticipated that the presentation and review conference will require approximately one working The presentation and review conference will be at the agreeable to installation on the date the Director Engineering and Housing, the AΕ and the Government's representative. The Contracting Officer may require a resubmittal of any document(s), if such document(s) are not approved because they are determined by the Contracting Officer to be inadequate for the intended purpose.

- 7.4.1 Interim Submittal. An interim report shall be submitted for review after the field survey has been completed and an analysis has been performed on all of the ECOs. The report shall indicate the work which has been accomplished to date, illustrate the methods and justifications of the approaches taken and contain a plan of the work remaining to complete the study. Calculations showing energy and dollar savings, SIR, and simple payback period of all the ECOs shall be included. The results of the ECO analyses shall be summarized by lists as follows:
- a.All ECOs eliminated from consideration shall be grouped into one listing with reasons for their elimination as discussed in par 5.3.
- b.All ECOs which were analysed shall be grouped into two listings, recommended and non-recommended, each arranged in order of descending SIR. These lists may be subdivided by building or area as appropriate for the study. The AE shall submit the Scope of Work and any modifications to the Scope of Work as an appendix to the report. A narrative summary describing the work and results to date shall be a part of this submittal. At the Interim Submittal and Review Conference, the Government's and AE's representatives shall coordinate with the Director of Public Works to provide the AE with direction for packaging or combining ECOs for programming purposes and also indicate the fiscal year for which the programming or implementation documentation shall be prepared. The survey forms completed during this audit shall be submitted with this report. The survey forms only may be submitted in final form with this submittal. They should be clearly marked at the time of submission that they are to be retained. They shall be bound in standard three-ring binder which will allow repeated disassembly and reassembly of the material contained within.
- 7.4.2 Final Submittal. The AE shall prepare and submit the final report when all sections of the report are 100% complete and all comments from the interim submittal have been resolved. The AE shall submit the Scope of Work for the study and any modifications to the Scope of Work, and a copy of the reponses to previous comments as an appendix to the submittal. The report shall contain a narrative summary of conclusions and recommendations, together with all raw and supporting data, methods used, and sources of information. The report shall integrate all aspects of the study. The recommended projects, as determined in accordance with paragraph 5, shall be presented in order of priority by SIR. The lists of ECOs specified in paragraph 7.4.1 shall also be included for continuity. The final report and all appendices shall be bound in standard three-ring binders which will allow repeated disassembly and reassembly. The final report shall be arranged to include:

- a. An Executive Summary to give a brief overview of what was accomplished and the results of this study using graphs, tables and charts as much as possible (See Annex B for minimum requirements).
- b. The narrative report describing the problem to be studied, the approach to be used, and the results of this study.
- c. Documentation for the recommended projects (includes LCCA Summary Sheets).
 - d. Appendices to include as a minimum:
 - 1) Energy cost development and backup data
 - 2) Detailed calculations
 - 3) Cost estimates
 - 4) Computer printouts (where applicable)
 - 5) Scope of Work

ANNEX A

DETAILED SCOPE OF WORK

1. LOCATION

a. GENERAL DESCRIPTION. The Architect Engineer (AE) shall furnish all services, materials, supplies, labor, equipment, investigations, studies, and travel as required in connection with the feasibility study for the below identified project in accordance with the contract and all furnished instructions:

INSTALLATION
Fort Leonard Wood, Missouri

<u>DESCRIPTION</u>
Insulating Brick Buildings

- b. The project consists of studying the feasibility of providing insulation for 100 existing brick buildings in the 600, 700, 800 & 1000 areas. The total floor area is over 2,000,000 square feet. There are approximately 15 typical buildings. The buildings were built in the early 1960s with little regard for energy conservation. The existing wall construction yields an "R" value of 4, which is 80% below current DOE reommendations for this area. This study would investigate the feasibility of installing insulation within these buildings.
- 2. <u>AUTHORIZATION</u>. The feasibility study for this project is authorized by Memorandum CEMP-ET, Subject: Energy Engineering Analysis Program (EEAP)-FY95S dated 30 December 1994. The AE shall make reference to this authority in the study.
- 3. <u>STUDY INSTRUCTIONS</u>. If the Design Manuals, Guide Specifications, and/or Project Engineering Instructions do not cover a specific condition in question, the AE shall contact the Contracting Officer before proceeding. If there is a conflict in Engineering Instructions or other reference data, such questions or conflicts should be brought to the attention of the Contracting Officer before proceeding.
- 4. THE INSTALLATION REPRESENTATIVE for this contract will be Mr. Douglas Cage, Directorate of Public Works, telephone number 314-596-0864, fax number 314-596-0882. The Kansas City Project Manager will be Mr. David Werner, telephone number 816-426-2597, fax number 816-426-3690. The Authorized Representative of the Contracting Officer will be Mr. Michael Whitacre, telephone number 816-426-2781, fax number 816-426-3690.
- 5. <u>COMPLETION AND PAYMENT SCHEDULE</u>: The following schedule shall be used as a guide in approving payments on this contract. The interim report shall be due not later than 180 days after Notice to Proceed. The final report shall be due not later than

60 days after the interim report review conference.

·	PERCENT OF CONTRACT AMOUNT
MILESTONE	AUTHORIZED FOR PAYMENT
Entry Interview	10
Completion of Field Work	2 5
Receipt of Interim Submittal	75 A & Review 85

6. METHOD OF PAYMENT.

- a. Title I. The AE shall prepare and submit to the US Army Engineer District, Kansas City, partial payment estimates in accordance with the attachment entitled "Instructions for Completion of ENG Form 93." All partial payments shall be based on work completed as of the 15th day of the report month and shall be submitted to the office of the Contracting Officer by the 18th day of the month. Payment under this contract, for which property or services are provided in a series of partial executions or deliveries, will be made within 30 days after receipt of an invoice which has been properly executed by the AE.
- b. Additional Conferences. Payment for furnishing the services of technically qualified representatives to attend additional conferences, when so requested in writing by the Contracting Officer, will be made at a rate per hour for the discipline involved plus travel expenses computed in accordance with Government Joint Travel Regulations in effect at the time travel is performed and actual cost of transportation.
- 7. THE SIMULATION PROGRAMS acceptable for use in this study are listed below. Any substitutes must be submitted and approved as outlined in the basic scope of work.
 - a. Building Loads and System Thermodynamics (BLAST)
 - b. DOE 2.1B (EZDOE)
 - c. Carrier E20 or Hourly Analysis Program (HAP)
 - d. Trane Air-Conditioning Economics (TRACE)
 - e. Beacon

8. A COMPUTER PROGRAM titled Life Cycle Costing in Design (LCCID) is available from the BLAST Support Office in Urbana, Illinois for a nominal fee. This computer program can be used for performing the economic calculations for ECIP and non-ECIP ECOs. The AE is encouraged to obtain and use this computer program. The BLAST Support Office can be contacted at 144 Mechanical Engineering Building, 1206 West Green Street, Urbana, Illinois 61801. Telephone number is (217) 333-3977 or (800) 842-5278.

9. FACILITY SURVEY

The Architect-Engineer (AE) shall conduct a survey of the buildings to be insulated.

10. AUTOMATED REVIEW MANAGEMENT SYSTEM (ARMS).

- a. The AE, as a part of this scope of work, shall interface with and utilize the Corps of Engineers Automated Review Management System for this project. The AE will receive one copy of CESPK-PAM 1110-1-2, AE Response Package (User's Manual) describing the communications software, optimum hardware requirements and access procedures. The necessary software is included with the manual. Minimum requirements are an IBM-XT or compatible computer system running DOS 3.0 or later, with 640 kilobyte (KB) RAM, at least a 20 megabyte (MB) hard disk and a 1200 or higher baud Hayes-compatible modem operating. Assistance can be received via a telephone hotline at 916-551-3126.
- b. All design review comments and responses will be electronically transmitted from the Corps of Engineer, Missouri River Division, by the ARMS. Comments can be received at a personal computer in the AE's office by use of ARMS software and a modem over telephone lines. The comments reside on the Missouri River Division computer. The AE can then download the review comments, respond to the comments, upload the comments back to the Division computer and forward responses to the Project Manager.

11. GOVERNMENT-FURNISHED DATA.

- a. AR 415-15 Military Construction, Army (MCA) Program Development
 - b. AR 415-20 Project Development and Design Approval
 - d. Engineering Instructions (as applicable)
 - e. Latest Tri-Service Cost Index.

- f. DAIM-FDF-U letter dated 10 January 1994, "Energy Conservation Investment Program (ECIP) Guidance".
 - g. TM 5-785 Engineering Weather Data
 - h. As-built drawings of the buildings

12. SUBMITTAL REQUIREMENTS.

ORGANIZATION	COPIES REQ (Correspondence);	UIRED Interim Review	(Final)
Commander Directorate of Public Water Environment, Energy, & 1 ATTN: ATZT-DPW-EE/Mr. Cater Building 2101 Fort Leonard Wood, Misse 65473-5000	Natural Rescource age	3*** Div.	(3)
District Engineer U.S. Army Engineer Dist: ATTN: CEMRK-EP-DI (WERN) 700 Federal Building, 69 Kansas City, Missouri 64106-2896	ER)		(3)
Division Engineer U.S.Army Engineer Divis Missouri River ATTN: CEMRD-MP-M (Jagas 12565 W. Center Road Omaha, NE 68144-3869		1	(1)
Commander USA TRADOC ATTN: ATBO-GF/ Mr. Hill Building 10 Fort Monroe, Va. 23351-		1	(1)
Commander U.S. Army Corps of Engi ATTN: CEMP-ET (Mr. Gent 20 Massachusetts Avenue Washington, DC 20314-10	il) , NW		(1)*
Commander U.S. Army Engineer Dist ATTN: CESAM-EN-DM (Mr. P.O. Box 2288 Mobile, AL 36628-1000	(1) rict, Mobile Battaglia)	1	(1)

ORGANIZATION

COPIES REQUIRED correspondence interim

final (1)*

Commander
U.S Army Logistics Evaluation Agency
ATTN: LOEA-PL (Mr. Keath)
New Cumberland Army Depot
New Cunberland, PA. 17070-5007

- * Executive Summary only
- *** Furnish copy of computer print out

LIST OF BUILDINGS TO BE STUDIED

BUILDING NO.	SQUARE FEET	CURRENT USE	
639	5413	BRANCH PX	
744	6240	BRANCH PX	
835	6240	BRANCH PX	
1026	8533	BRANCH PX	4
638	9236	BRIGADE HQ	
.741	9236	BRIGADE HQ	
844	9890	BRIGADE HQ	
1018	9890	BRIGADE HQ	4
637	8949	CHAPEL	
742	8949	CHAPEL	
843	8890	CHAPEL	<u> </u>
630	13280	DINING FACILITY	
632	13280	DINING FACILITY	
653	13280	DINING FACILITY	
657	13280	DINING FACILITY	
735	13280	DINING FACILITY	
739	13280	DINING FACILITY	
749	13280	DINING FACILITY	
754	13280	DINING FACILITY	
820	13280	DINING FACILITY	
821	13280	DINING FACILITY	
836	13280	DINING FACILITY	
837	13280	DINING FACILITY	
1010	13280	DINING FACILITY	
1011	13280	DINING FACILITY	
1027	13280	DINING FACILITY	15
638	3700	DISPENSARY	
743	3700	DISPENSARY	
832	3700	DISPENSARY	_3
640	20425	GYM	
746	20425	GYM	
826	20425	GYM	<u>3</u>
626	12155	SUPPLY/ADMIN	
633	12155	SUPPLY/ADMIN	
655	12155	SUPPLY/ADMIN	
656	12155	SUPPLY/ADMIN	
733	12155	SUPPLY/ADMIN	
734	12155	SUPPLY/ADMIN	
751	12155	SUPPLY/ADMIN	
752	12155	SUPPLY/ADMIN	
823	12155	SUPPLY/ADMIN	
824	12155	SUPPLY/ADMIN	
840	12155	SUPPLY/ADMIN	
841	12155	SUPPLY/ADMIN	
1006	12155	SUPPLY/ADMIN	•
1007	12155	SUPPLY/ADMIN	
1025	12155	SUPPLY/ADMIN	15
1045			

BUILDING NO.	SQUARE FEET	CURRENT USE
627	40640	BARRACKS
628	40640	BARRACKS
629	40640	BARRACKS
634	40990	BARRACKS
635	40990	BARRACKS
651	40990	BARRACKS
652	40990	BARRACKS
654	40990	BARRACKS
659	40990	BARRACKS
660	40990	BARRACKS
730	40640	BARRACKS
731	40640	BARRACKS
736	40640	BARRACKS
737	40640	BARRACKS
738	40640	BARRACKS
747	40640	BARRACKS
748	40640	BARRACKS
75 5	40640	BARRACKS
756	40640	BARRACKS
757	40640	BARRACKS
815	40640	BARRACKS
816	40640	BARRACKS
817	40640	BARRACKS
818	40640	BARRACKS
819	40640	BARRACKS
827	40640	BARRACKS
828	40640	BARRACKS
829	40640	BARRACKS
830	40640	BARRACKS
831	40640	BARRACKS
1012	40640	BARRACKS
1013	40640	BARRACKS
1014	40640	BARRACKS
1015	40640	BARRACKS
1016	40640	BARRACKS
1028 1029	40640 40640	BARRACKS
626	6163	BARRACKS 37 BN HQ/ADMIN
631	6163	BN HQ/ADMIN
650	6163	BN HQ/ADMIN
658	6163	BN HQ/ADMIN
732	6163	BN HQ/ADMIN
740	6163	BN HQ/ADMIN
750	6163	BN HQ/ADMIN
753	6163	BN HQ/ADMIN
822	6163	BN HQ/ADMIN
825	6163	BN HQ/ADMIN
838	6163	BN HQ/ADMIN
842	6163	BN HQ/ADMIN
1008	6163	BN HQ/ADMIN
		~

BUILDING NO.	SQUARE FEET	CURRENT USE
1000	6163	BN HQ/ADMIN
1009 1022	6163	BN HQ/ADMIN
1023	6163	BN HQ/ADMIN 16 100
TOTAL NUMBER OF	BUILDINGS	100

*MODELING AND CALCULATION OF TYPICAL BUILDINGS MAY BE EXTENDED TO COVER BUILDINGS OF SIMILAR CONSTRUCTION.

TO RE ADDED

ANNEX B

EXECUTIVE SUMMARY GUIDELINE

- 1. Introduction.
- Building Data (types, number of similar buildings, sizes, etc.)
- 3. Present Energy Consumption of Buildings or Systems Studied.
 - o Total Annual Energy Used.
 - o Source Energy Consumption.

Electricity - KWH, Dollars, BTU
Fuel Oil - GALS, Dollars, BTU
Natural Gas - THERMS, Dollars, BTU
Propane - GALS, Dollars, BTU
Other - QTY, Dollars, BTU

- 4. Reevaluated Projects Results.
- 5. Energy Conservation Analysis.
 - o ECOs Investigated.
 - o ECOs Recommended.
 - o ECOs Rejected. (Provide economics or reasons)
 - o ECIP Projects Developed. (Provide list)*
 - o Non-ECIP Projects Developed. (Provide list)*
 - o Operational or Policy Change Recommendations.
- * Include the following data from the life cycle cost analysis summary sheet: the cost (construction plus SIOH), the annual energy savings (type and amount), the annual dollar savings, the SIR, the simple payback period and the analysis date.
- 6. Energy and Cost Savings.
 - o Total Potential Energy and Cost Savings.
 - o Percentage of Energy Conserved.

o Energy Use and Cost Before and After the Energy Conservation Opportunities are Implemented.

ANNEX C

REQUIRED DD FORM 1391 DATA

To facilitate ECIP project approval, the following supplemental data shall be provided:

- a. In title block clearly identify projects as "ECIP."
- b. Complete description of each item of work to be accomplished including quantity, square footage, etc.
- c. A comprehensive list of buildings, zones, or areas including building numbers, square foot floor area, designated temporary or permanent, and usage (administration, patient treatment, etc.).
- d. List references, and assumptions, and provide calculations to support dollar and energy savings, and indicate any added costs.
- (1) If a specific building, zone, or area is used for sample calculations, identify building, zone or area, category, orientation, square footage, floor area, window and wall area for each exposure.
 - (2) Identify weather data source.
- (3) Identify infiltration assumptions before and after improvements.
- (4) Include source of expertise and demonstrate savings claimed. Identify any special or critical environmental conditions such as pressure relationships, exhaust or outside air quantities, temperatures, humidity, etc.
- e. Claims for boiler efficiency improvements must identify data to support present properly adjusted boiler operation and future expected efficiency. If full replacement of boilers is indicated, explain rejection of alternatives such as replace burners, nonfunctioning controls, etc. Assessment of the complete existing installation is required to make accurate determinations of required retrofit actions.
 - f. Lighting retrofit projects must identify number and type of fixtures, and wattage of each fixture being deleted and installed. New lighting shall be only of the level to meet current criteria. Lamp changes in existing fixtures is not considered an ECIP type project.

- g. An ECIP life cycle cost analysis summary sheet as shown in the ECIP Guidance shall be provided for the complete project and for each discrete part included in the project. The SIR is applicable to all segments of the project. Supporting documentation consisting of basic engineering and economic calculations showing how savings were determined shall be included.
- h. The DD Form 1391 face sheet shall include, for the complete project, the annual dollar and MBTU savings, SIR, simple amortization period and a statement attesting that all buildings and retrofit actions will be in active use throughout the amortization period.
- i. The calendar year in which the cost was calculated shall be clearly shown on the DD Form 1391.
- j. For each temporary building included in a project, separate documentation is required showing (1) a minimum 10-year continuing need, based on the installation's annual real property utilization survey, for active building retention after retrofit, (2) the specific retrofit action applicable and (3) an economic analysis supporting the specific retrofit.
- k. Nonappropriated funded facilities will not be included in an ECIP project without an accompanying statement certifying that utility costs are not reimbursable.
- 1. Any requirements required by ECIP guidance dated 10 January 1994 and any revisions thereto. Note that unescalated costs/savings are to be used in the economic analyses.
- m. The five digit category number for all ECIP projects except for Family Housing is 80000. The category code number for Family Housing projects is 71100.



2 August 1995

EMC # P13F-030

Department of the Army Kansas City District, Corps of Engineers Attn: CEMRK-CT-M/Butler 700 Federal Building Kansas City, Missouri 64103-2896

Re:

DACA01-94-D-0033

Limited Energy Study, Insulating Brick Buildings

Fort Leonard Wood, Missouri

Dear Ms. Butler:

Enclosed is our revised fee proposal for the above referenced project. The fee is based on work defined by the Scope of Work dated 10 April 1995.

We propose a fee of \$90,771 for the work on this project.

There is one item in the Scope of Work which was clarified during fee negotiation:

 Paragraph 3.4 indicates that "Meetings will be scheduled when ever requested by the AE or the Contracting Officer". We have budgeted for only two trips to Fort Leonard Wood. Additional trips for additional meetings will require additional compensation.

Attached is a quote for a round trip coach ticket from Denver to St. Louis. A regular coach class ticket purchased 8-2-95 for 9-10-95 flight from either Denver or Colorado Springs is \$928.00.

We look forward to working with you on this project. Please give me a call if you have any questions.

Sincerely,

EMCENGINEERS, INC.

Dennis Jones

DJ:nj w:\dennis\leonwood\fee-let.doc



2750 South Wadsworth Blvd. • Suite C-200 Denver, Colorado 80227-3400 303/988-2951 • Fax: 303/985-2527

CONFIRMATION NOTICE

Confirmation Notice No. 1

EMC #1406.011

DATE:

27 November 1995

PROJECT:

Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood,

Missouri

CONTRACT NO.: DACA 01-94-D-0033, Del. Ord. 0009

NOTES

PREPARED BY:

Alan Niemeyer, EMC Engineers, Inc.

DATE OF

MEETING:

6 November 1995

PLACE OF

MEETING:

Building 2101, Ft. Leonard Wood, Missouri

SUBJECT:

Entrance Interview Meeting

ATTENDEES:

Douglas Cage

Directorate of Public Works (DPW) Energy,

(314) 596-0869

Fort Leonard Wood

Alan Niemeyer

EMC Engineers, Inc.

(303) 988-2951

David Sinz

EMC Engineers, Inc.

(303) 988-2951

Introductions were made at the start of the meeting.

The Scope of Work (SOW) was reviewed. The following items were clarified:

- EMC will evaluate insulation installed on interior surfaces, and will not evaluate insulation installed on the exterior brick wall or roof surfaces.
- EMC will include roof insulation as part of the energy study.
- The SOW states there are 15 representative buildings in the list of 100 buildings. Mr. Niemeyer stated that after reviewing the list of 100 buildings, the study would require between 10 and 12 representative buildings for the purpose of computer building energy simulations. Mr. Cage stated that 10 to 12 representative buildings would be satisfactory, and that the 15 representative buildings in the SOW was an estimate.

Confirmation Notice No. 1 27 November 1995

Page 2 of 2

The field survey procedures were discussed. Mr. Niemeyer stated that EMC would survey the representative buildings in detail, and then would walk through the remaining buildings to record any differences. The field survey data will be recorded on field survey forms (see attached forms). EMC will observe the baseboard radiation and fan coil units during the field survey to determine if they can be moved easily for the insulation upgrade.

The approach to the study was briefly discussed. Mr. Niemeyer asked if DPW would provide the optimum R-values for insulation on walls and roofs at Ft. Leonard Wood. Mr. Cage said that an evaluation to determine the optimum R-values should be included in the study. Mr. Niemeyer said EMC will perform life cycle costing to determine the optimum R-values.

Mr. Cage stated the project SIR and Simple Payback are important factors to consider for project funding. Mr. Niemeyer stated that EMC will consider ways to optimize these factors.

Alan J. Niemeyer

Clan A. Thim

Project Engineer, E M C Engineers, Inc.

Attachments: Field Survey Forms

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

E M C No. 1406-011
Date:
Prepared by:

ILDING MANAGER INTERVIEW

BUILDING INFORMATION	(:			
Building No:	Building Name:			
Surveyed by:	Date:		Building Use:	
Building Contact:			Phone No:	
Building Contact:			Phone No:	
OCCUPANCY:				
Number of Employees:	Mon./Fri.:	Schedule:	То	
	Tues./Thurs.		То	
	Wed.		То	
	Sat./Sun.		То	
Visitors Per Day:	Mon./Fri.:	Schedule:	То	
	Tues./Thurs.		То	
	Wed.		То	
	Sat./Sun.	****	То	
Comments:				
LIGHTING SCHEDULE:				
Normal Occupancy:	MonFri.:	Schedule:	То	
	Sat./Sun.:		То	
Cleaning Crew/2nd Shift:	MonFri.:	Schedule:	То	
	Sat./Sun.:		То	
EQUIPMENT SCHEDULE:				
Fan/AHU Schedule:	MonFri.:	Schedule:	То	
	Sat./Sun.:		То	
Chiller Schedule:	MonFri.:	Schedule:	То	
	Sat./Sun.:		То	
Boiler Schedule:	MonFri.:	Schedule:	То	
	Sat./Sun.:		То	
Aux. Equipment Schedule:				
	MonFri.:	Schedule:	То	
	Sat./Sun.:		То	
	MonFri.:	Schedule:	То	
	Sat./Sun.:		То	
Comments:				

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

Building No:	Building Name:	
		_

E M C No. 1406-011
Date:
Prepared by:

BUILDING ENVELOPE

		EXTERIOR WALLS	LIST (OF EXT. WALL CONSTRUCTION TYPES
Wal!	Wall			
Direction (N,	Construction		Wali	
E, W, or S)	No.	Comments	Construction No.	Description
			XW-I	Face Brick & CMU
			XW-2	Face Brick, CMU, & Gyp. Board
			XW-3	Face Brick, CMU, & Ceramic Tile
			XW-4	Face Brick, CMU, & Plaster Coat
			XW-5	Insulated Metal Panel
			XW-6	
			XW-7	
			XW-8	
		WINDOWS		LIST OF WINDOW TYPES
Window	Window			ביז טו מומטטמ וווני
Direction (N,	Construction		Window	
E, W, or S)	No.	Comments	Construction No.	Description
			W-I	Double Pane Clear
			W-2	Double Pane Tinted
			W-3	Single Pane with Storm Windows
			W-4	Single Pane
			W-5	
			W-6	
			W-7	
			W-8	
		ROOF CONSTRUCTION		OF ROOF CONSTRUCTION TYPES
Roof	Roof			
Direction (N,	Construction		Roof	
E, W, or S)	No.	Comments	Construction No.	Description
				BUR, Rigid Insul., Metal Deck, Air Space,
			R-1	Ceiling Tile
			R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile
				BUR, Rigid Insul., Metal Deck, Air Space,
			R-3	Plaster Ceiling
				BUR, Rigid Insul., Metal Deck, Air Space, 6'
			R-4	Batt Insul., Plaster Ceiling
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Ceiling
			R-7	
:			R-8	

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No:	Building Name:
Jananig ito.	

E M C No. 1406-011
Date:
Prepared by:

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

Wall Direction (N, E, W, or S) Item No. No. of Items Comments Comments Comments	A-I A-2 A-3 A-4 A-5 A-6 P-I P-2 P-3 P-4 P-5 P-6	Description Architectural Interior Partitions Wall Placards Drapery Valances Drapery Rods Plumbing Sinks Commodes Toilet Stalls Water Fountains
	A-2 A-3 A-4 A-5 A-6 P-1 P-2 P-3 P-4	Architectural Interior Partitions Wall Placards Drapery Valances Drapery Rods Plumbing Sinks Commodes Toilet Stalls
	A-2 A-3 A-4 A-5 A-6 P-1 P-2 P-3 P-4	Wall Placards Drapery Valances Drapery Rods Plumbing Sinks Commodes Toilet Stalls
	A-3 A-4 A-5 A-6 P-1 P-2 P-3 P-4 P-5	Drapery Valances Drapery Rods Plumbing Sinks Commodes Toilet Stalls
	A-4 A-5 A-6 P-1 P-2 P-3 P-4 P-5	Drapery Rods Plumbing Sinks Commodes Toilet Stalls
	P-I P-2 P-3 P-4 P-5	Drapery Rods Plumbing Sinks Commodes Toilet Stalls
	P-I P-2 P-3 P-4 P-5	Sinks Commodes Toilet Stalls
	P-I P-2 P-3 P-4 P-5	Sinks Commodes Toilet Stalls
	P-2 P-3 P-4 P-5	Sinks Commodes Toilet Stalls
	P-2 P-3 P-4 P-5	Commodes Toilet Stalls
	P-3 P-4 P-5	Toilet Stalls
	P-4 P-5	
	P-5	Water Fountains
		
	P-6	
	l ————————	
	<u> </u>	HVAC Mechanical
	M-1 M-2	Floor Supply/Return Grilles
	M-2 M-3	Ceiling Supply/Return Grilles Finned-Tube Baseboard Radiators
	M-4	Thermostats / Space Temp. Sensors
	M-5	inciniostats / space temp. Sensors
	M-6	
	M-7	
	11-7	Electrical
	E-I	Electrical Panels
	E-2	Electrical Outlets
	E-3	Electrical Light Switches
	E-4	•
	E-5	
	E-6	
	E-7	
		Lighting
· · · · · · · · · · · · · · · · · · ·	L-I	Wall Mounted Fixtures
	L-2	Ceiling Mounted Fixtures
	L-3	Exit Signs
	L-4	
	L-5	
		Fire Protection
	f-l	Alarm Pull Switches
	F-2	Alarm Sound Devices (Speakers, Bells)
	F-3	Sprinkler Heads
	F-4	Fire Extinguishes
	F-5	
	F-6	
		Communication
	(-1	Telephones - Wall Mounted
	C-2	Telephones - Booth Mounted
	(-3	Telephone Jacks
	C-4	1



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CONFIRMATION NOTICE

Confirmation Notice No. 2

EMC #1406.011

DATE:

27 November 1995

PROJECT:

Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood,

Missouri

CONTRACT NO.: DACA 01-94-D-0033, Del. Ord. 0009

NOTES

PREPARED BY:

Alan Niemeyer, EMC Engineers, Inc.

DATE OF

MEETING:

8 November 1995

PLACE OF

MEETING:

Building 2101, Fort Leonard Wood, Missouri

SUBJECT:

Exit Interview Meeting

ATTENDEES:

Douglas Cage

Directorate of Public Works (DPW) Energy,

(314) 596-0869

Alan Niemeyer

Fort Leonard Wood EMC Engineers, Inc.

(303) 988-2951

David Sinz

EMC Engineers, Inc.

(303) 988-2951

Mr. Niemeyer stated that few problems were encountered thus far during the field survey. Most people at the buildings being surveyed had been helpful.

Mr. Niemeyer stated that relocation of baseboard radiation and fan coil units may be feasible for the insulation upgrade on walls. The cost for relocation of this equipment will be included in the study.

Mr. Niemeyer stated that EMC had obtained needed information from DPW including the following:

- utility rates
- list of buildings connected to the energy monitoring control system

Confirmation Notice No. 2 27 November 1995

Page 2 of 2

copies of drawings requested by EMC from DPW.

Mr. Niemeyer asked if Mr. Cage had any special areas for consideration to be included in the study. Mr. Cage said EMC should evaluate installing insulation over existing insulated panels above windows. Also, Mr. Cage said that an SIR in the range of 4.0 would be a target SIR for a project that would be competitive for funding.

Alan J. Niemeyer

Project Engineer, EMC Engineers, Inc.

BRAD ADAMS WALKER ARCHITECTURE PC

201 FILLMORE STREET • SUITE 201 • DENVER CO 80206 (303) 388-9500 FAX (303) 388-2305

17 January 1996

Mr. Alan J. Niemeyer EMC Engineers, Inc. 2750 South Wadsworth Blvd., Suite C-200 Denver, CO 80227-3400

Re: ARMY ENGINEER DISTRICT, MOBILE, ALABAMA
Limited Energy Study - Insulate Brick Buildings
Fort Leonard Wood, Missouri
DACA01-94-D-0033
Delivery Order No. 0009
EMC Project No. 1406-011
BAW Project No. 95020.00
Recommendation Letter

Dear Alan,

We are writing this letter to outline insulation recommendations for Fort Leonard Wood, Missouri. These recommendations are intended to support a Limited Energy Study being developed by EMC Engineers, Inc. The project incorporates one hundred buildings. However, the scope of this letter is limited to five building types: Administration, Mess Hall, Barracks, Gymnasium, and a Chapel. Recommendations for each of these building types shall be extrapolated by EMC to the one hundred buildings. This method shall allow EMC to factor cost estimates for each building type as part of the study.

The scope of these preliminary recommendations is limited to discussions with your office, review of existing photographs, and review of drawings of each building type. The scope does not include site observation and investigation of the buildings included in this study. In addition, it does not incorporate project design services. Thus, we recommend that each building be reviewed and be analyzed specifically during the design stage of this project. Issues to review during the design stage include clearance issues, materials that meet the architectural guidelines of the base comprehensive plan, and mechanical/electrical coordination.

General Recommendations

The existing "r-value" of the exterior walls for the administration buildings, mess halls, barracks, gymnasiums, and chapels was reported to be "r - 4". The exterior wall of the buildings was observed to be cavity wall construction made of brick masonry, an air space, and concrete masonry units. In order to increase the "r-value" of the perimeter walls, we recommend the following:

- 1. Provide six inch metal stud construction with three and one-half inch thick batt insulation and a vapor barrier. Install the metal studs adjacent the interior face of the existing walls. Provide an air space between the batt insulation and the existing walls. Finish the interior face with gypsum wall board. Paint the gypsum wall board to match the adjacent surfaces. Provide rubber base.
- 2. If there are clearance issues to resolve, consider installing furring channels with rigid insulation and gypsum wall board. Provide an air space to separate the insulation from the existing masonry walls. Finish the gypsum wall board with paint to match adjacent surfaces. Provide rubber base.
- 3. For bathroom areas, in lieu of the gypsum wall board noted above, install ceramic wall tile on water resistant gypsum wall board. During review of the existing drawings, it was noted that plumbing fixtures and piping may require relocation in order to insulate the perimeter walls. Provide ceramic tile base, in lieu of rubber base.
- 4. For shower and kitchen areas, in lieu of gypsum wall board noted above, provide tile on cementitious backer board. Provide ceramic tile base, in lieu of rubber base.
- 5. For fire rated assemblies, provide fire resistive, type X, gypsum wall board wall construction as acceptable to the governing code authority.
- 6. In order to accomplish the perimeter wall construction, approximately four feet (minimum) of ceiling will need to be replaced. Estimate areas to be patched with like materials. Consider acoustical tile and grid for administration areas and plaster patching for hard surfaced ceiling areas.
- 7. Reconfigure spaces in order to maintain clearance issues.

Mess Hall Considerations

During the review of existing photographs and drawings, it was noted that the kitchen equipment would need to be modified in order to insulate the perimeter walls.

Barracks Considerations

The interior faces of walls in the barracks are made of concrete masonry units. These walls are extremely durable. If the perimeter walls are insulated, provide cementitious backer board in lieu of gypsum wall board. If the budget allows, finish the cementitious backer board with ceramic tile.

Gymnasium Considerations

Provide a durable wall material for added wall construction in the gymnasium and racquetball courts.

Chapel Considerations

Maintain or replace existing wood finishes in order to insulate the existing walls. We recommend further coordination of finishes and materials for these design sensitive areas.

If you have any questions about the above, please don't hesitate to contact me at our office.

Very truly yours,

BRAD ADAMS WALKER ARCHITECTURE, P.C.

John T. Tindall Project Manager

cc: B

BAW

B. Walker

BAW

File



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CONFIRMATION NOTICE

Confirmation Notice No. 3

EMC #1406.011

DATE:

14 May 1996

PROJECT:

Limited Energy Study, Insulate Brick Buildings, Ft. Leonard Wood, Mo.

CONTRACT NO.: DACA 01-94-D-0033, Delivery Order No. 0009

PREPARED BY:

Alan Niemeyer, EMC Engineers, Inc.

SUBJECT:

Interim Submittal Review Comments

Review comments were received for the Interim Submittal from the following organizations:

U.S. Army Engineer District, Kansas City, MO

U.S. Army Engineer District, Mobile, AL

The responses to the review comments are as follows:

Comments from Ms. Hoban, U.S. Army Engineer District, Kansas City, MO:

- Comment #1. Annotation: CONCUR. Reference to economic summary table will be 1. corrected.
- Comment #2. Annotation: DISAGREE. The scope of this energy study evaluates 2. specific Energy Conservation Opportunities (ECOs) to determine their energy savings potential and economic feasibility. The Architectural and Engineering Instructions Design Criteria CEMP-E, dated 3 July 1994, paragraph 3.d.3, page 11-4 refers to design guidelines which are used to determine design heating and cooling loads for buildings. Paragraph 3.d.3 states that "Process loads will not be included", which is good engineering practice when calculating design heating and cooling loads. However, the scope of this energy study does not evaluate the design heating and cooling loads for the buildings, but does evaluate the existing building energy use and the energy savings that can accrue by implementing ECOs.

Process loads (such as personal computers, printers, copy machines, microwave ovens, refrigerators, etc.) generate heat gain to the buildings space. The heat gain from process loads will affect the buildings energy use by decreasing heating loads and increasing cooling loads. The process loads must be included in the energy analysis to accurately reflect the buildings energy use.

In this study, energy savings are calculated by subtracting the Energy Conservation Opportunity (ECO) energy use from the Baseline energy use. The process loads remain the same in both the ECO and the Baseline, and therefore do not contribute to the energy savings.

- 3. <u>Comment #3</u>. Annotation: INFO. The electrical demand includes the process loads. Refer to the discussion in Comment #2. The process loads remain the same in both the ECO and the Baseline, and therefore do not contribute to the electrical demand savings.
- 4. <u>Comment #4</u>. Annotation: INFO. The unit costs of electricity and natural gas were provided to EMC by the Directorate of Public Works at Fort Leonard Wood. The unit costs reflect their billing records.

Comments from Robert S. Woodruff, EN-DM, Mobile District, AL:

- 5. <u>Comment #1</u>. Annotation: CONCUR. Additional verbiage will be included to clarify why equipment and objects on or near exterior walls were surveyed and documented.
- 6. <u>Comment #2</u>. Annotation: INFO. The lowest life cycle cost in each of the three categories occurs for the 0 in. thickness. However, the report states that the lowest life cycle costs for insulation installed are indicated by the shaded areas.
- 7. <u>Comment #3</u>. Annotation: CONCUR. The last paragraph on page 2-1 addresses the electrical demand. Additional verbiage will be added to the previous paragraph to clearly state the unit cost of electricity.
- 8. Comment #4. Annotation: CONCUR

Alan J. Niemeyer

Project Engineer, E M C Engineers, Inc.

Attachments: Government Review Comments

cc:

David E. Werner

Allen Simpson

Tony Battaglia

Mr. Jagasits

Mr. Hill

Dennis Jones

File

If any portion of this Confirmation Notice is incorrect, please notify us immediately. If correspondence is not received to the contrary within 14 days, it will be assumed that the decisions, conclusions, and status outlined in this Confirmation Notice are correct.

Thursday April 4, 1996 et Sort Type = None Page: 1

LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS, FT. LW MO

File: N:\RV\PROJECTS\LENGSTDY.DBF

NUM Name Office Page/Sheet Discipline Rm/Detail

1 HOBAN EP-DL ES-5 MEC

PARAGRAPH AHEAD OF THE "RECOMMENDATIONS" REFER TO TABLE ES-3 ON PAGE ES-6.

THIS SHOULD BE TABLE ES-4.

2 NOBAN EP-DL SECTION 5 MEC IT APPEARS THAT ON ALL OF THE STUDIES THAT THE PROCESS LOAD HAS BEEN INCLUDED IN THE ENERGY USAGE ANALYSIS.

THE AEI (ARCHITECTUAL and ENGINEERING INSTRUCTIONS) DESIGN CRITERIA, CHAPTER 11, PARAGRAPH 3.d.3 (PG 11-4) STATES THAT *PROCESS LOADS WILL NOT BE INCLUDED.**

PLEASE REVISE THE STUDY TO ELIMINATE THE PROCESS LOADS FROM THE ENERGY USAGE FIGURES, THE ELECTRICAL DEMAND, AND ALL THE ASSOCIATED COSTS.

3 HOBAN EP-DL SECTIONS 1-9 MEC DOES THE PEAK ELECTRICAL DEMAND INCLUDE THE PROCESS LOADS? SEE PREVIOUS COMMENT.

4 HOBAN EP-DL ENERGY COST MEC
PLEASE VERIFY THE COST OF THE ELECTRICITY AND GAS. THE GAS COST SEEMS LOW
FOR THE AREA.

Post-It™ brand fax transmittal m	From DAVID WERNER
CO. EM C ENGINEER INC	
DEPURE, CO.	Phone \$16 426 2597
	Fax 4 816 426 3690A.

AORI	I. S. Army	T PROJECT REVIEW COMMENTS: Corps of Engineers Kansas City District	DATE: 10 May 1996 FROM: Robert S. Woodruff, CESAM-	Page 1 of 1 EN-DM
	Attn: Dave V		Phone: (334) 694-6074 FAX: (334) 6	
ROJI	CT/FY: Ins	ulate Brick Buildings		
		Leonard Wood Missouri		
		nterim Report		
NO.	Page/Par	COMM		Response to Comment
1.	Page ES-	The first paragraph under "Approach" states documented. At first the need to do this does report. Because many people will only read this documentation was necessary should be proceed that the process of the state	n't make sense but is explained later in the he executive summary the reason why	
2.	Page ES- 3	Based on the information presented in Table three situations 0 in. thickness, not the shade	BS-1 isn't the lowest life cycle cost for all d value?	
3.	Page 2-1	The energy cost of electricity should be added		
4.	General	Based on the fact that none of the ECO's med implementation the AE should issue the final should be canceled.	et the minimum criteria for report but the final report but the final report presentation	
-				
	,			
	<u> </u>		·	

APPENDIX B

BEACON ENERGY ANALYSIS PROGRAM DESCRIPTION

APPENDIX B BEACON ENERGY ANALYSIS PROGRAM

The BEACON energy analysis program was developed by Energy Systems Engineers, Inc. of Denver, Colorado.

BEACON is a multizone building energy program that computes yearly heating and cooling energy requirements for each hour of the year. Solar, direct gain, indirect gain, insolated gain, and hybrid passive solar buildings can be simulated as well as conventional buildings.

The number of zones that can be simulated is limited only by the capacity of the disk drive on which the output file is written. A run may consist of one base case zone followed by several reruns of the zone with different options, or several different zones on a single system.

The program was originally designed to provide quick energy analyses of building envelope options, to aid in selection of the most cost effective configuration. However, BEACON can be used for many purposes including equipment selection and energy conservation studies for existing buildings.

BEACON uses transfer functions as defined in the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 1977 and 1985 Handbook of Fundamentals to compute heat loss or gain through walls and roofs. All of the ASHRAE transfer functions are contained in the program so that all the user has to do is select the desired configuration and input the code number and the program will load the appropriate set of transfer functions. Heat loss or gain through basement walls and floors, concrete slab-on-grade, and partitions can also be included. The internal mass of the building is accounted for with a distinct thermal capacity node that is appropriate connected to the walls, roof, internal air and ground with convective and radiative coupling. Heating and cooling energy required to maintain the internal mass at the desired temperature is introduced into the internal air node.

The program has data for sixty different glass types that can be called into use by specifying the appropriate number. Solar radiation transmitted through the glass as a function of solar incident angle and absorption in the glass is computed using the glass data.

Several building heating and cooling systems can be simulated, including the on-off control of a residential furnace home, constant air volume with reheat, double duct, indirect/direct evaporative cooling, chilled water storage, variable air volume with economizer, and others.

Internal heat gain for lights, people, and appliances can be profiled so that each hour of the day can be a different value. Heating and cooling thermostats can be set for a different value for each hour of the day, and a different set of values on the weekend.

BEACON can use real weather or synthetic data. The real weather file must be in a format compatible with BEACON. For real weather files, contact Energy Systems Engineers, Inc. The hourly synthetic weather data is generated from monthly average data input to the program.

BEACON has been used extensively by several engineering firms for the past fifteen years. The accuracy and utility of the program has been verified many times over. Anyone familiar with building envelope components and heating and cooling equipment will find BEACON easy to use. This is extremely attractive to anyone who has loaded and run such programs as DOE or BLAST.

APPENDIX C

OPTIMUM INSULATION ANALYSIS BACKUP DATA

GENERAL

Appendix C contains the backup data for the optimum insulation thickness analysis. The following data is included in the order listed:

- Construction costs for installing wall and roof insulation
- BEACON computer simulations for evaluating optimum thickness for fiberglass batt insulation on walls
- BEACON computer simulations for evaluating optimum thickness for rigid insulation on walls
- BEACON computer simulations for evaluating optimum thickness for fiberglass batt insulation on roofs.

INSULATION COST SUMMARY FOR LIFE CYCLE COSTS

Install Fiberglass Insulation on Wall (\$/Sq Ft)

		Thicknesses of Rigid Insulation									
	1	in.	3.5	3.5 in.		6 in.		9 in.		12 in.	
Item	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	
Fiberglass Batt			1523.4		1247 1 118 17 11				1.00		
Insulation	0.20	0.005	0.19	0.005	0.25	0.005	0.45	0.006	0.61	0.006	
Wood Wall Studs	0.35	0.027	0.35	0.027	0.50	0.029	0.85	0.055	0.99	0.057	
Gypsum Wall Board	0.21	0.034	0.21	0.034	0.21	0.034	0.21	0.034	0.21	0.034	
Wall Painting	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010	
Total Cost per Sq Ft	0.831	0.076	0.821	0.076	1.025	0.078	1.576	0.105	1.880	0.107	

Install Rigid Insulation on Wall (\$/Sq Ft)

21101111 111011111111111111111111111111												
		Thicknesses of Rigid Insulation										
	0.75	in.	1 in.		1.5 in.		2 in.		2.5 in.		3 :	in.
Item	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.
Rigid Insulation	0.35	0.010	0.39	0.010	0.48	0.010	0.62	0.011	0.75	0.011	0.88	0.011
Wood Furring Strips	0.20	0.016	0.20	0.016	0.20	0.016	0.20	0.016	0.20	0.016	0.20	0.016
Gypsum Wall Board	0.21	0.017	0.21	0.017	0.21	0.017	0.21	0.017	0.21	0.017	0.21	0.017
Wall Painting	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010	0.07	0.010
Total Cost per Sq Ft	0.830	0.053	0.870	0.053	0.960	0.053	1.100	0.054	1.230	0.054	1.360	0.054

Install Fiberglass Batt Insulation on Roof (\$/Sq Ft)

			T	Thicknesses of Rigid Insulation							
	1 i	1 in.		3.5 in.		6 in.		9 in.		12 in.	
Item	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	Mat.	Lab.	
Fiberglass Batt		ì									
Insulation	0.20	0.005	0.22	0.005	0.28	0.006	0.45	0.007	0.61	0.008	
Total Cost per Sq Ft	0.200	0.005	0.220	0.005	0.280	0.006	0.450	0.007	0.610	0.008	



```
BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION
  ----- PROGRAM CONTROL OPTIONS -----
  COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
  WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 ******REAL WEATHER FROM DISK******
  FILE NAME SPRNGFMO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                                    37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                      1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                         56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
 FLOOR AREA (SQFT) 5795.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
 INFILTRATION PROFILE
                                      .850 .850 .850
 1.001.001.001.001.001.00.850.850
A FACTOR IN INFILTRATION EQUATION (CINA)

B FACTOR IN INFILTRATION EQUATION (CINB)

C FACTOR IN INFILTRATION EQUATION (CINC)

8.330000E-03
 BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                         WALL DATA
WALL NUMBER
                                        1 2
AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00 WALL AREA SQFT (AWLL) 1000.0 849.0 1039.0 482.0 WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 105.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 10.5 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0
                                         .00 90.00 180.00 -90.00
```

\sim	1	1
L	1	-1

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	.244
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01829	
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5	.00003	.00003	.00003 .00281	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1 N=2 N=3 N=4 N=5	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=6	*****	*****	*****	*****
ROOF AREA SQFT (AROF) 5795	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)			_	
ROOF B TRANSFER FUNCTIONS (BNR)			
.000 .181E-05 .272E-04	.898E-04	.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36		.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	0000	
SKYLIGHT HEIGHT FT (SKH) 0.				
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SK		00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)			
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (SHSK) 0	.00000E+0	00	
SUMMER START MONTH AND DAY FOR	SHSK (MST	,NDST)	1	1
SUMMER END MONTH AND DAY FOR S			1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-H	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.100000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7 750.		
HOUR	HO	OURLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
1.000
        1.000
                  .900 1.000
                                                70.0
                                                          76.0
  9
                          1.000
                                   1.000
                                                          76.0
         1.000
                   .900
                                                70.0
 10
                                    .800
                           .800
                    .800
                                                70.0
                                                          76.0
 11
          .800
                                     .400
                                               70.0
                            .400
                                                          76.0
 12
          .500
                    .500
                                               70.0
                                                          76.0
                            .800
                                     .800
 13
           .800
                    .800
                    .900
                                               70.0
                                                          76.0
         1.000
                          1.000
                                   1.000
 14
                                               70.0
                                                          76.0
                    .900
                          1.000
                                   1.000
 15
         1.000
         1.000
                         1.000
                                   1.000
                                               70.0
                                                          76.0
                    .900
 16
                                               70.0
                                                          76.0
                    .800
                           1.000
                                   1.000
         1.000
 17
                           .100
          .200
                    .200
                                    .100
                                               70.0
 18
                    .000
                                     .000
           .100
                            .000
                                               70.0
                                                          76.0
 19
                           .000
                                               70.0
                                                         76.0
                    .000
                                     .000
 20
           .100
                                                        76.0
                                               70.0
                                     .000
 21
           .100
                    .000
                                               70.0
                                     .000
                                                         76.0
 22
           .100
                    .000
                                                70.0
                                                         76.0
                         .000 .000 70.0
.000 .000 70.0
                                     .000
 23
           .100
                    .000
                                                         76.0
           .100
                    .000
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
                             0.000000E+00
SYSTEM SUPPLY AIR START TIME HR
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                    .400
.100 .191 .200 .286 .300 .369
                                                               .451
                                            .718
                          .625
                                    .700
         .537
                 .600
                                                     .800
                                                              .812
.500
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 4
                          1.00
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000 .000 .000 .000 .000
                                                     .000 .000
                          .000
                                   .000
                                            .000
         .000
                 .000
                                                     .000
                                                               .000
.000
                          .000
.000
                 .000
         .000
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BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTI: DOO! AND				VENT AND	
MNTI	LOAD I					BSMT	WAT.T.	WINDOM	V INFL	
	.00								.00	
	-76.44	LOSS		-1.11	-8.90	.00	-17.21	-7.08	-73.63	.00
					. 0.50			,,,,,	73.03	
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
		LOSS							-62.34	
								• • • • • •		
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-45.15				-7.02				-56.71	
APR	10.37	GAIN	11.93	.01	04	.00	2.43	.03	.27	1.64
	-16.81				-4.19		-5.08			.00
MAY	25.19	GAIN	13.07	.03	.14	.00	4.54	.11	.87	6.48
	-1.92	LOSS		23	-2.52				-19.17	
JUN	60.32	GAIN	13.17	.09	.40	.00	6.92	.32	2.62	25.49
	.00	LOSS		08	-1.19	.00	62	91	-8.72	.00
JUL	84.51	GAIN	13.38		1.02				6.90	
	.00	LOSS		05	73	.00	29	57	-5.45	.00
AUG		GAIN	11.73		.77				4.98	
	.00	LOSS		05	81	.00	36	62	-5.27	.00
ann	42 52	CI 2 727	10 10	0.4	2.0	0.0	4 53	2.0	2 24	
SEP	43.52 -2.94		10.12		.39				2.74	
	-2.94	LUSS		21	-1.97	.00	-1.94	-1.55	-14.61	.00
ОСТ	8.73	GAIN	8 62	0.0	.06	0.0	1 34	05	.39	2 68
	-14.07		0.02	- 51	-4.00	00	-5.62			.00
	11.0,	LODD		.51	. 1.00		5.02	3.12	27.51	.00
NOV	1.48	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
		LOSS					-9.96			.00
				•						
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-74.67				-8.71				-70.54	
TOT	314. -326.	GAIN	124.	0.	3.	0.	38.	2.	19.	129.
	-326.	LOSS		-6.	-53.	0.	-84.	-42.	19. -422.	0.
	HEATING									
MAX	${\tt COOLING}$	LOAD=	283	3237.	BTUH ON	JUL 23	HOUR 14	AME	BIENT TEN	MP 68.

ZONE UA BTU/HR-F 1402.2

BEACON Energy Analysis	By EMC Engineers, Inc.	625WB-1.I
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BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION .

NTERNA	ΔТ.								FAN T	OTAL
	INTE TEM	PERAT	SPACE URE F			COIN- CIDENT	THOUSAND	MILLION	MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	76.	69.	4 27		7 62. 5 4.	3.32	12.81	4.22	24.09
FEB	70.	76.	69.			7 64. 5 14.	2.95	11.38	3.81	21.47
MAR	71.	78.	69.	12 4		5 72. 5 15.	3.26	12.57	4.22	23.72
APR	73.	78.	69.	30 9		84. 5 30.	3.14	12.09	4.08	22.85
MAY	75.	78.	70.			5 80. 5 39.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.		1!	5 89. 5 57.	3.14	12.09	4.08	22.85
JUL	77.	78.	73.			5 91. 5 60.	3.26	12.57	4.22	23.72
AUG	77.	78.	71.			4 87. 7 55.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.			1 85. 5 39.	3.08	11.86	4.08	22.48
OCT	73.	78.	69.	5 28			3.32	12.81	4.22	24.09
NOV	71.	77.	69.	8	16	5 75. 5 18.	3.20	12.33	4.08	23.22
DEC	70.	74.	67.		1.	7 52. 5 0.	3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM I	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	655	2	1	0	2720E+06	.0000
FEB	535	0	0	0	2327E+06	.0000
MAR	477	29	0	0	2352E+06	.1054E+06
APR	239	149	0	0	1465E+06	.1556E+06
MAY	38	317	0	0	9830E+05	
JUN	0	482	0	0		.1914E+06
JUL	0	607	0	=	.0000	.2522E+06
AUG	0		-	0	.0000	.2832E+06
	•	589	0	0	.0000	.2581E+06
SEP	65	367	0	0	9600E+05	.2404E+06
OCT	236	130	0	0	1368E+06	.1826E+06
NOV	435	39	0	0	1979E+06	.1295E+06
DEC	684	0	10	•	2720E+06	
YEAR	3364	2711	11			.0000
	2304	2,11	11	0	2720E+06	.2832E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	ION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	107.31	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.80	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.93	.08	3.26	12.57	1.24	23.72	20.8
APR	27.42	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.62	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.49	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.32	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.91	3.32	12.81	1.24	24.09	31.2
SEP	5.79	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.49	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.84	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.68	.00	3.20	12.33	1.24	23.35	12.6
YEAR	480.89	23.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153834. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 625WB-1.I

BLDG 625 - BATTALION HQ BASERUN FOR WALL INSULATION

OTHER MONTHLY STATISTICS

,	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	A	AVG. MBT. DEG. F	MAX SYSTEMP. DIDEG.	RIFT		S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD · BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2327E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1054E+06	2352E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1556E+06	1465E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	9830E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2522E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2404E+06	9600E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.1826E+06	1368E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1295E+06	1979E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	0000	2720E+06

WINDOW WIDTH FT (WNDW)

WIDTH OF OVERHANG (WOH)
OVERHANG HGT ABV WNDW (HOH)

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BLDG 625 - BATTALION HQ INSTALL 1 IN. FIBERGLASS BATT INSULATION
----- PROGRAM CONTROL OPTIONS -----
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)
                                    3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
                                            9.000000E-03
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)
                                            272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                WALL DATA
                                WALL DATA . 1 2 3
WALL NUMBER
AZIMUTH ANGLE (AZ)
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
AZIMUTH ANGLE (AZ)
                                          90.00 180.00 -90.00
                                 .00
                            1000.0 849.0 1039.0
135.0 90.0 180.0
                                                            482.0
                              135.0 90.0 180.0 105.0

10.0 10.0 10.0 10.0

13.5 9.0 18.0 10.5

.0 .0 .0 .0 .0
WINDOW HEIGHT FT (WNDH)
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.122	.122	.122	.122
CN FACTORS	.00385	.00385	.00385	.00385
CN FACTORS NUMBER OF BN FACTORS (NB BN FACTORS BN (BN)				
N=1	. 00000	00000	00000	00000
N=2	00042	00042	00042	00042
N=3	00197	00197	00197	00197
N=4	00131	00131	00131	00137
N=5	.00015	00015	00015	00015
N=6	******	******	*******	******
NUMBER OF DN FACTORS (ND)	6	6	6	6
BN FACTORS BN (BN) N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND) DN FACTORS	Ü	Ü		O
N=1 N=2 N=3 N=4 N=5 N=6	1.00000	1.00000	1 00000	1 00000
N=2	-1.66125	-1.66125	-1.66125	-1 66125
N=3	.83196	.83196	.83196	83196
N=4	14508	- 14508	- 14508	- 14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	- 00002
ROOF AREA SQFT (AROF) 5795	.000000			.00002
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES. 0=NO)	(TROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.9678	92E-04	_	
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .181E-05 .272E-04		.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.97 1.36		.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.0				
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST	,NDST)	1	1
SUMMER END MONTH AND DAY FOR SI	ASK (MND, N.	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)			•	
DAYTIME SKY LIGHT U BTU/SQFT-HE	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	4.100000	E-01

-----INTERNAL GAINS AND PROFILES ------

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
9
          1.000
                   .900 1.000 1.000
                                                  70.0
                                                             76.0
  10
          1.000
                    .900 1.000
                                     1.000
                                                 70.0
                                                             76.0
                 .800
.500
.800
.900
.900
.900
.200
.000
                    .800
                             .800
  11
           .800
                                                  70.0
                                      .800
                                                            76.0
  12
           .500
                    .500
                              .400
                                       .400
                                                  70.0
                                                            76.0
                    .800 .800 .800
.900 1.000 1.000
.900 1.000 1.000
.900 1.000 1.000
.800 1.000 1.000
           .800
  13
                                                  70.0
                                                            76.0
  14
          1.000
                                                  70.0
                                                            76.0
  15
          1.000
                                                            76.0
                                                  70.0
  16
                                                 70.0
          1.000
                                                            76.0
                                                          76.0
76.0
76.0
76.0
                                                 70.0
  17
          1.000
                                                70.0
70.0
70.0
70.0
  18
           .200
                                     .100
                            .100
            .100
  19
                             .000
                                      .000
  20
            .100
                             .000
                                      .000
                 .100
  21
                                                          76.0
           .100
  22
                                                           76.0
           .100
  23
                                                           76.0
           .100
  24
                                                           76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR
                               0.00000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                               24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
.100 .191 .200 .286 .300 .369
                                                      .400 .451
         .537
                  .600
.500
                            .625
                                     .700
                                             .718
                                                       .800
                                                                 .812
       .906 1.00
.900
                            1.00
CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000
                                                                 .000
                                                      .000
                                                                .000
```

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI'	ľN				
			SOLAR		D001	R			VENT	1
			THRU		AND				AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDO	W INFL	LATENT
	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-67.94	LOSS		-1.12	-8.92	.00	-8.53	-7.09°	-73.78	.00
	.00		9.28				.00			.00
	-52.73	LOSS		92	-7.57	.00	-6.43	-6.04	-62.52	.00
MAR	.93	GAIN	11.72	.00	.00	.00	.10	.00	0.0	.02
		LOSS			-7.03		-4.83			.00
								5.00	30.,5	
APR	10.10	GAIN	11.93	.01	.04	.00	.65	.03	.26	1.73
	-15.01	LOSS		46	-4.18	.00	-2.07	-3.34	-31.94	.00
MAY		GAIN	13.07						.87	6.50
	-1.65	LOSS		23	-2.51	.00	48	-1.93	-18.84	.00
JUN	57.66	GAIN	13.17	0.9	.40	.00	2 15	2.2	2.63	25.40
0 01.		LOSS	13.17		-1.17		01			
		2000		.00	1.17	.00	.01	50	-0.10	.00
JUL	79.08	GAIN	13.38	.18	1.02	.00	4.47	.82	6.91	35.30
	.00	LOSS		05	73	.00	02	56	-5.37	.00
אנזכ	72 00	CATN	71 72	• •	-					
AUG	73.88 .00	GAIN LOSS	11.73	.13	.77 80	.00			4.99	34.47
	.00	LOSS		05	80	.00	02	62	-5.15	.00
SEP	41.00	GAIN	10.12	.05	.39	.00	1.90	.32	2.74	18.90
	-2.54	LOSS			-1.97	.00	56	-1.54	-14.56	.00
								٠		
OCT	8.47		8.62				.32			
	-12.00	LOSS		51	-4.03	.00	-2.46	-3.13	-29.51	.00
NOV	1.56	GAIN	6.92	.00	.00	.00	.03	.00	. 00	.44
	-30.84	LOSS			-5.78		-4.82		-44.06	
	.00		6.45	.00	.00	.00	.00	.00	.00	.00
	-66.16	LOSS		-1.11	-8.72	.00	-8.60	-6.86	-70.66	.00
mom.	297.	CATN	104		_	•				
101	-289.				3.		16. -39.	۷.	19.	125.
	-203.	ಗಿರವಿ		-b.	-53.	υ.	-39.	-42.	-421.	υ.
MAX	HEATING	LOAD=	-270	252. B	TUH ON	DEC 18	HOUR 4	AME	BIENT TE	MP 1.
MAX	COOLING	LOAD=	283	635. B	TUH ON	JUL 23	HOUR 14	AME	BIENT TE	MP 68.

ZONE UA BTU/HR-F 989.3

THE REPORT OF THE PARTY OF THE

BEACON Energy Analysis By EMC Engineers, Inc. 625WB-2.I

BLDG 625 - BATTALION HQ INSTALL 1 IN. FIBERGLASS BATT INSULATION

7.1MDD.11									FAN T	OTAL
INTERNA		ד ג זאם	SPACE		_	OIN-	I.TCHTING	PROCESS	HEAT	HEAT GAIN
			URE F			IDENT			MILLION	
MONTH								BTU	BTU	BTU
11011111	AVO.	1.11.11	11111	<i>D</i> 111	1110 1		20022	210	210	210
JAN	70.	77.		4	17	62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		27		74.	3.14	12.09	4.08	22.85
			70.	1	2	34.				
147.17		7.0				0.0	2 22	10 01	4.22	24 00
MAY	/5.	78.	70.		15	80. 39.	3.32	12.81	4.22	24.09
			70.	11	5	39.			.	
JUN	76	78.		12	14	85.	3.14	12 09	4.08	22.85
OON	,	,	71.		6		3.11	12.05	1.00	22.03
					•	•				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
AUG	76.	78.				87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.		3		89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
0.00	77	78.		5	14	77.	3.32	10 01	4.22	24.09
OCT	/3.	76.	70.		6		3.32	12.61	4.22	24.09
			70.	20	•	23.				
NOV	71.	77.		8	15	76.	3.20	12.33	4.08	23.22
2101	,			-	6		5,125			
				-	-	-				
DEC	70.	75.		12	16	59.	3.20	12.33	4.22	23.35
			69.	18	· 6	0.				
YEAR							38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF H	OURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WERE	NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OLING	HEATING	COOLING
		_		_		
JAN	633	4	0	0	2624E+06	.0000
FEB	517	1	0	0	2130E+06	.0000
MAR	454	28	0	0	2154E+06	.9733E+05
APR	222	142	0	0	1322E+06	.1504E+06
MAY	34	303	0	0	8618E+05	.1802E+06
JUN	. 0	448	0	0	.0000	.2404E+06
JUL	0	582	0	0	.0000	.2836E+06
AUG	0	552	0	0	.0000	.2497E+06
SEP	61	347	0	0	8579E+05	.2319E+06
OCT	213	126	0	0	1252E+06	.1771E+06
NOV	411	42	0	0	1787E+06	.1277E+06
DEC	658	0	0	0	2703E+06	.0000
YEAR	3203	2575	0	0	2703E+06	.2836E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	TION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	97.15	.00	3.32	12.81	1.24	24.09	12.6
FEB	76.40	.00	2.95	11.38	1.12	21.47	12.6
MAR	60.85	.08	3.26	12.57	1.24	23.72	20.3
APR	24.86	.84	3.14	12.09	1.20	22.85	23.5
MAY	3.12	1.90	3.32	12.81	1.24	24.09	25.4
JUN	.00	4.31	3.14	12.09	1.20	22.85	29.8
JUL	.00	5.94	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.54	3.32	12.81	1.24	24.09	30.5
SEP	5.19	3.10	3.08	11.86	1.20	22.48	29.1
OCT	21.32	.68	3.32	12.81	1.24	24.09	25.2
NOV	49.14	.13	3.20	12.33	1.20	23.22	22.1
DEC	96.45	.00	3.20	12.33	1.24	23.35	12.6
YEAR	434.48	22.52	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 145123. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

				CITTE	Chonin	נט ייי	TATIOTI	.05		
	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-	A		MAX SYS TEMP. D DEG.	RIFT	SYSTEM NOT	LOADS	· MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
MONTH	DAY	DAY	FACTOR	F	+	-			•	
NAL	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2624E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2130E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9733E+05	2154E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1504E+06	1322E+06
YAM	2566.	1826.	1.000	65.	0.	0.	0	0	.1802E+06	8618E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2404E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2836E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2497E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2319E+06	8579E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1771E+06	1252E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1277E+06	1787E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2703E+06

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BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FIBERGLASS BATT INSULATION
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
 SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 ******REAL WEATHER FROM DISK******
  FILE NAME SPRNGFMO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                                   37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
 FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
 INFILTRATION PROFILE
                                                                       .050 1.00
1.00 1.00
.850 PFT
          1.00 1.00 1.00 1.00
1.00 .850 .850 .850
IN INFILTRATION FOR THE
 .850 .850 .850
                                                             .850
 1.00
                                                            1.00
                                                 .850
 1.00
                                                             .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) .49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                       WALL DATA
WALL NUMBER
                                         1 2
                                                               3
AZIMUTH ANGLE (AZ)
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
                                       .00 90.00 180.00 -90.00
                                   1000.0 849.0 1039.0 482.0
WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 105.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 10.5 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL IRANSPER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.00204	.00204	.00204	.00204
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5 N=6	.00000	.00000	.00000	00000
N=2	.00022	.00022	.00022	00000
N=3	.00104	.00104	.00104	00104
N=4	.00070	.00070	.00070	00070
N=5	.00008	.00008	.00008	00008
N=6	*****	*****	*****	******
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SOFT (AROF) 5795	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	00002
2 ()				
ROOF U VALUE BTU/HR-SQFT-F (UR)	F) 3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YI	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.9678	92E-04	_	
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .181E-05 .272E-04	.898E-04	.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	0.00	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS)	FT (SKOH)	0.0000	00E+00	
SKYLIGHT SHADING COEFFICIENT (S	1		_	
SUMMER START MONTH AND DAY FOR	HSK) U.	.000000E+0	0	
SUMMER END MONTH AND DAY FOR	SHSK (MST,	, NDST)	1	1
SUMMER END MONTH AND DAY FOR SH SKY LIGHT AREA SQFT (ASKY) 0	IN COCCOUNT	(טאכ	1	1
DAYTIME SKY LIGHT U BTU/SQFT-HR	- F / CPSTT		202000	
NIGHT TIME SKYLIGHT U BTU/SQFT-	r (SKIU)	I.	292998	
FRACTION OF PROCESS HEAT TO INT	TING, TRINGE	אר (בואר)	1.292998	
11 10 1N1	DIMMI SPAC	E (FAP)	4.100000	1- Ô T

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	DURLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

9	1.000	.900	1.000	1.000	70.0	76	.0
10	1.000	.900	1.000	1.000	70.0	76	.0
11	.800	.800	.800	.800	70.0	76	.0
12	.500	.500	.400	.400	70.0	76	.0
13	.800	.800	.800	.800	70.0	76	.0
14	1.000	.900	1.000	1.000	70.0	76	.0
15	1.000	.900	1.000	1.000	70.0	76	.0
16	1.000	.900	1.000	1.000	70.0	76	.0
17	1.000	.800	1.000	1.000	70.0	76	.0
18	.200	.200	.100	.100	70.0	76	.0
19	.100	.000	.000	.000	70.0	76	.0
20	.100	.000	.000	.000	70.0	76	.0
21	.100	.000	.000	.000	70.0	76	.0
22	.100	.000	.000	.000	70.0		.0
23	.100	.000	.000	.000	70.0	76	.0
24	.100	.000	.000		70.0	76	.0
	ING ABOVE AMB						
	ING BELOW AMB		•	OT) 65.	.000000		
	TYPE, (IECN)		2				
	AIR CFM (SACF						
	ZER HIGH TEMP						
	SUPPLY AIR ST				•		
	SUPPLY AIR ST			.000000			
	MIXED AIR TEM						
	SIDE AIR FRAC			1.00000	00E-01		
	ICIENCY (EFAN		0000E-01	050005 01			
	AL PRESSURE II PLANT RATED (000		
	PLANT RATED						
	PLANT PART LO						
.100		.200	.286	.300		.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00	.,	.,_0		
	TYPE (ITYPCH)		4				
	PLANT RATED			360000.000	0000		
	PLANT RATED						
	PLANT PART LO						
.000	.000	.000	.000			.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

	LOAD			ROOF	PARTITI DOOR AND SLAB .00	BSMT	WALL .00		VENT AND INFL .00	
		LOSS			-8.93	.00	-4.53		-73.90	
	.00 -49.90	GAIN LOSS	9.28		.00 -7.58	.00	.00 -3.42	.00 -6.05	.00 -62.67	.00
	.98 -38.44	GAIN LOSS	11.72		.00 -7.04		.05 -2.57			.03
	9.99 -14.32	GAIN LOSS	11.93		.04 -4.19		.34 -1.10		.26 -31.95	1.65
MAY	23.56 -1.61	GAIN LOSS	13.07		.14 -2.50	.00			.87 -18.73	
JUN		GAIN LOSS	13.17		.40 -1.16	.00			2.63 -7.96	24.03
JUL		GAIN LOSS	13.38		1.02 72	.00	2.38		6.92 -5.29	33.45
AUG	70.50 .00	GAIN LOSS	11.73		.77 79				4.99 -5.06	32.71
SEP	39.51 -2.47		10.12		.39 -1.96	.00			2.74 -14.53	18.09
	8.47 -11.22		8.62		.06 -4.04		.17 -1.31			
	1.63 -28.87		6.92		.00 -5.79		.01 -2.57			.44
	.00 -62.22				.00 -8.73		.00 -4.56			.00
TOT	285. -273.		124.	0. -6.	3. -53.	0. 0.	9. -21.	2. -42.	19. -422.	119. 0.
							HOUR 4 HOUR 14			

ZONE UA BTU/HR-F 796.8

BEACON Energy Analysis By EMC Engineers, Inc. 625WB-3.I

									FAN T	LATC
NTERNA MONTH	INTE	PERAT	URE F				LIGHTING THOUSAND KWH		MILLION	
JAN	70.	77.	69.	_		62. 4.	3.32	12.81	4.22	24.09
FEB	71.	76.		26 2			2.95	11.38	3.81	21.47
MAR	71.	77.	69.		15 6	72. 15.	3.26	12.57	4.22	23.72
APR	73.	78.	70.	24 14	15 6	81. 29.	3.14	12.09	4.08	22.85
MAY	75.	78.	70.	15 11		80. 39.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.		-	85. 57.	3.14	12.09	4.08	22.85
JUL	77.	78.	73.			91. 60.	3.26	12.57	4.22	23.72
AUG	76.	78.	71.			87. 51.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.			85. 39.	3.08	11.86	4.08	22.48
OCT	73.	78.	70.	5 28		77. 33.	3.32	12.81	4.22	24.09
NOV	71.	77.	69.	8	15		3.20	12.33	4.08	23.22
DEC	70.	75	69.			5 59. 5 0.	3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

-						
		COOLING	NUMBER OF I	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WERE	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	620	4	0	0 -	.2554E+06	.0000
FEB	504	3	0	0 -	.2063E+06	.0000
MAR	441	30	0	0 -	.2092E+06	.9752E+05
APR	216	137	0	0 -	.1287E+06	.1494E+06
MAY	35	297	0	0 -	.8457E+05	.1778E+06
JUN	0	418	0	0	.0000	.2376E+06
JUL	0	545	0	0	.0000	.2833E+06
AUG	0	520	0	0	.0000	.2472E+06
SEP	61	331	0	0 -	.8345E+05	.2300E+06
OCT	204	127	0	0 -	.1221E+06	.1760E+06
NOV	398	44	0	0 -	.1722E+06	.1281E+06
DEC	640	0	0	0 -	.2609E+06	.0000
YEAR	3119	2456	0	0 -	.2609E+06	.2833E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	92.45	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.87	.00	2.95	11.38	1.12	21.47	12.6
MAR	58.16	.09	3.26	12.57	1.24	23.72	20.3
APR	23.89	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.14	1.86	3.32	12.81	1.24	24.09	25.3
JUN	.00	4.11	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.63	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.28	3.32	12.81	1.24	24.09	30.3
SEP	5.13	2.98	3.08	11.86	1.20	22.48	28.9
OCT	20.11	.68	3.32	12.81	1.24	24.09	25.1
NOV	46.62	.14	3.20	12.33	1.20	23.22	22.1
DEC	91.43	.00	3.20	12.33	1.24	23.35	12.6
YEAR	413.80	21.59	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 141005. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2554E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2063E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9752E+05	2092E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1494E+06	1287E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1778E+06	8457E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2376E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2472E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2300E+06	8345E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1760E+06	1221E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1281E+06	1722E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2609E+06

```
BLDG 625 - BATTALION HQ INSTALL 6 IN. FIBERGLASS BATT INSULATION
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
  FILE NAME SPRNGFMO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1) 37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                                            1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO)
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
 FLOOR AREA (SQFT) 5795.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
 INFILTRATION PROFILE
  .850 1.00
1.00 1.00
                                                                                                         1.00
                                                                                                         .850
                                                                                                                          .850
 A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
 BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
 PARTITION UA BTU/HR-F (GUA) 0.000000E+00
 DOOR UA BTU/HR-F (DUA) . 49.200000
 WINDOW GLASS NUMBER (NG) 30
 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                                                           6.930472E-01
 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
 WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                                       1 2 3 4 .00 90.00 180.00 -00
                                                          WALL DATA
WALL NUMBER

AZIMUTH ANGLE (AZ)

WALL AREA SQFT (AWLL)

WINDOW AREA SQFT (AWND)

WINDOW HEIGHT FT (WNDH)

WINDOW WIDTH FT (WNDW)

WINDOW WIDTH FT (WNDW)

WIDTH OF OVERHANG (WOH)

OUTDUARD HOLD ABV WNDW (HOH)

AZIMUTH ANGLE (AZ)

00 90.00

180.00

-90.00

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180.00

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 WALL NUMBER
                                                                           90.00 180.00 -90.00
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MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.043	.043	.043	.043
WALL TRANSFER FUNCTIONS	00117	00117	.00117	00117
NUMBER OF BN FACTORS (NB	5	5		J
BN FACTORS BN (BN)	00000	00000	.00000	00000
N=1 N=2 N=3 N=4 N=5 N=6	.00000	00000	00000	00010
N=2	.00010	.00010	00010	00057
N=3	.00057	.00057	.00057	00037
N=4	.00044	.00044	.00044	00004
N=5	.00006	.00000	.00000	.00000
N=6 NUMBER OF DN FACTORS (ND)	*****	~ · · · · · · · ·	6	6
HOMBER OF BR THEFORE (HD)	6	ь	ь	6
DN FACTORS	1 00000	1 00000	1 00000	1 00000
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 5795	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1./1064	-1./1004	00725
N=3	.89735	16643	16643	16643
N=4	16643	16643	16643	10043
N=5	.00728	.00728	.00728	.00726
N=6 ROOF AREA SQFT (AROF) 5795	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 5/95 ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF U VALUE BTU/HR-SQFI-F (GR ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF TRANS FUNCTIONS USED (I=1 ROOF C TRANSFER FUNCTION (CNR)			1	
		92E-04		
ROOF B TRANSFER FUNCTIONS (BNR .000 .181E-05 .272E-04		6718-04	1275-04	
ROOF D TRANSFER FUNCTIONS (DNR		.07IL-04	,12/E 04	
1.00 -1.97 1.36	, _ 410	534F-01	- 250E-02	
SKYLIGHT TILT DEGREES (TILT)	0 000000	F+00	.2502 02	
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKINIGHT AZIMOTH ANGLE DECKEDS	000000000000000000000000000000000000000)		
SKYLIGHT HEIGHT FT (SKH) 0. SKYLIGHT WIDTH FT (SKW) 0.0	000000E+00	,		
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT			00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (SHSK) 0	.00000E+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR S	HSK (MND, N	IDND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	-00		
DAYTIME SKY LIGHT U BTU/SQFT-H	R-F (SKYU)	1.	.292998	
NIGHT TIME SKYLIGHT U BTU/SQFT FRACTION OF PROCESS HEAT TO IN	-HR-F (SKY	(UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	ACE (FAP)	4.100000)E-01

-----INTERNAL GAINS AND PROFILES ------

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR - PEOPLE	PEOPLE		
	LIGHTS	PROCESS :	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HC	URLY FRAC	TION OF PE.	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

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9
          1.000
                     .900
                            1.000
                                     1.000
                                                  70.0
                                                             76.0
 10
          1.000
                     .900
                            1.000
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                                                  70.0
                                                             76.0
                     .800
                                                  70.0
                                                             76.0
 11
           .800
                              .800
                                       .800
                     .500
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                                                             76.0
 12
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                                                  70.0
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 13
                              .800
                                       .800
          1.000
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                                                             76.0
 14
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 15
          1.000
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                                     1.000
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 16
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                     .900
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                                                             76.0
                                     1.000
 17
          1.000
                     .800
                            1.000
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                                                             76.0
                            .100
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 18
           .200
                     .200
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                                                   70.0
                                                             76.0
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                          65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM)
                        9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR
                              0.00000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                                24.000000
SYSTEM MIXED AIR TEMP (TMXAIR)
                                55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN)
                      5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                           .369
                                                        .400
         .191
                 .200 .286 .300
                                                                 .451
.500
          .537
                   .600
                            .625
                                     .700
                                               .718
                                                        .800
                                                                 .812
.900
         .906
                  1.00
                            1.00
CHILLER TYPE (ITYPCH)
                            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)
                                     360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)
                                     82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
         .000
                                           .000
                                                        .000
.000
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ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI'	rn				
			SOLAR		D001				VENT	
			THRU		AND				AND	
	H LOAD				SLAB		WALL	WINDO	W INFL	LATENT
	.00		7.38						.00	
	-62.61	LOSS		-1.12	-8.93	.00	-2.99	-7.11	-73.95	.00
FER	.00	GAIN	9.28	0.0	0.0	0.0	.00	0.0	00	0.0
	-48.81	LOSS	7.20		-7.58		-2.26			.00 .00
	10.01	Вово		, , ,	-7.50	.00	-2.26	-6.06	-62.73	.00
MAR	.99	GAIN	11.72	.00	.00	.00	.03	.00	.00	.03
	-37.67	LOSS			-7.05		-1.69			.00
APR	9.98	GAIN	11.93	.01	.04	.00	.21	.03	.26	1.65
	-14.06	LOSS		46	-4.19	.00	72	-3.34	-31.96	.00
147.77	00.00	~ · · · · ·								
MAY	23.30	GAIN	13.07		.14		.58	.11	.87	
	-1.60	LOSS		23	-2.49	.00	16	-1.92	-18.69	.00
JUN	53.96	GAIN	13.17	.09	.40	.00	1 11	3.2	2.63	23.41
		LOSS			-1.15				-7.89	
								.00	7.05	.00
JUL	74.03	GAIN	13.38	.18	1.02	.00	1.57	.82	6.92	33.00
	.00	LOSS		04					-5.26	.00
AUG		GAIN	11.73	.13					4.99	32.20
	.00	LOSS		05	79	.00	.00	61	-5.02	.00
SEP	39.11	GAIN	10.12	05	.39	0.0	66	3.2	2.74	17.95
		LOSS	10.12		-1.96		19			.00
OCT	8.43	GAIN	8.62	.00	.06	.00	.11	.05	.38	2.54
	-10.92	LOSS		51	-4.04	.00	86	-3.15	-29.76	.00
	1.65		6.92	.00			.01			.44
	-28.10	LOSS			-5.80	.00	-1.69	-4.52	-44.31	.00
DEC	.00	CATN	6 15		.00	0.0	0.0	0.0	.00	0.0
	-60.71				-8.73		-3.02			.00
	00.71	БОВВ		1.11	-0.75	.00	-3.02	-6.67	-70.77	.00
TOT	281.	GAIN	124.	0.	3.	0.	6.	2.	19.	118.
	-267.								-422.	
			.							
MAX	HEATING COOLING	LOAD=	-257	177. E	TUH ON	DEC 18	HOUR 4	AME	SIENT TEN	MP 1.
XAIM	COOLING	LOAD≔	283	131. E	TUH ON	JUL 23	HOUR 14	AMB	SIENT TEN	MP 68.

ZONE UA BTU/HR-F 723.0

BEACON Energy Analysis By EMC Engineers, Inc. 625WB-4.I

									FAN T	OTAL
INTERN	INTE		SPACE URE F			COIN-	LIGHTING THOUSAND			
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	77.	69.	4 27		63. 4.	3.32	12.81	4.22	24.09
FEB	71.	76.	69.	26 2		60. 14.	2.95	11.38	3.81	21.47
MAR	71.	77.	69.	12 3		72. 15.	3.26	12.57	4.22	23.72
APR	73.	78.	70.	24 14		81. 29.	3.14	12.09	4.08	22.85
MAY	75.	78.	70.	15 11		80.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.	12 17		85. 57.	3.14	12.09	4.08	22.85
JUL	76.	78.	72.	13 10		91. 60.	3.26	12.57	4.22	23.72
AUG	76.	78.	71.			87. 51.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.	11 15		85. 39.	3.08	11.86	4.08	22.48
OCT	73.	78.	70.			77.	3.32	12.81	4.22	24.09
NOV	72.	77.	69.	8		76. 18.	3.20	12.33	4.08	23.22
DEC	70.	7 5.	69.	12 18	16 6		3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

	COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
	INCLUDING	LOADS WER	E NOT MET	BTU	J
HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
618	5	0	0	2526E+06	.0000
497	5	0	0	2036E+06	.0000
437	30	0	0	2067E+06	.9746E+05
213	137	0	0	1272E+06	.1489E+06
34	294	0	0	8387E+05	.1768E+06
0	406	0	0	.0000	.2364E+06
0	538	0	0	.0000	.2831E+06
0	509	0	0	.0000	.2462E+06
61	328	0	0	8247E+05	.2293E+06
203	125	0	0	1208E+06	.1756E+06
390	45	0	0	1696E+06	.1281E+06
636	0	0	0	2572E+06	.0000
3089	2422	0	0	2572E+06	.2831E+06
	618 497 437 213 34 0 0 0 61 203 390 636	INCLUDING ECONOMIZER 618 5 497 5 437 30 213 137 34 294 0 406 0 538 0 509 61 328 203 125 390 45 636 0	INCLUDING LOADS WER. 618 5 0 497 5 0 437 30 0 213 137 0 34 294 0 0 406 0 0 538 0 0 509 0 61 328 0 203 125 0 390 45 0 636 0 0	INCLUDING LOADS WERE NOT MET	INCLUDING LOADS WERE NOT MET BTG

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	90.84	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.40	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.19	.09	3.26	12.57	1.24	23.72	20.3
APR	23.47	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.06	1.84	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.02	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.54	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.19	3.32	12.81	1.24	24.09	30.3
SEP	5.10	2.95	3.08	11.86	1.20	22.48	28.8
OCT	19.80	.68	3.32	12.81	1.24	24.09	25.1
NOV	45.47	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.72	.00	3.20	12.33	1.24	23.35	12.6
YEAR	406.05	21.27	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139481. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

				OTH	ER MONTH	LY S	TATIST.	ICS		
	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.								
		HORIZ.						SWHEN	MUMIXAM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	ΓΕM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/	P	MBT.	TEMP. DI	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	2526E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2036E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9746E+05	2067E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1489E+06	1272E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1768E+06	8387E+05
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.2364E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2831E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.2462E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2293E+06	8247E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1756E+06	1208E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1281E+06	1696E+06
DEC	883.	604.	1.000	35.	0.	0.	0	О.	.0000	2572E+06

10.5 .0 .0

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BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
        .850 .850 .850 .850 .850
1.00 1.00 1.00 1.00 1.00
1.00 .850 .850 .850 .850
                                                    .850 .850 1.00
1.00 1.00 1.00
 .850 .850 .850
 1.00
                                                                .850
                                                                            .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.20000
WINDOW GLASS NUMBER (NG) 30
                               49.200000
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                    WALL DATA
                                   1 2
                                                        3 4
WALL NUMBER
                                              90.00 180.00 -90.00
                                    .00
AZIMUTH ANGLE (AZ)
WALL AREA SQFT (AWLL)
                                1000.0 849.0 1039.0 482.0
                                 135.0
                                             90.0 180.0 105.0
WINDOW AREA SQFT (AWND)
WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 WIDTH OF OVERHANG (WOH) .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0
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Water Corner to the control of				
MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
0 11EOE 2107 (IRC-5QF1-F) (OW)	.029	.029	.029	.029
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00080		.00080	
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2				
N=3	.00039	.00039	.00039	.00039
N=4				
N=5	.00004	.00004	.00030 .00004	.00004
N=6	*****	******	******	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	- 16643
N=1 N=2 N=3 N=4 N=5	.00728	.00728	.00728	.00728
N=6	00002	00002	.00728 00002	- 00002
ROOF AREA SQFT (AROF) 5795	.000000			.00002
ROOF U VALUE BTU/HR-SOFT-F (IIR	F) 3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.9678	92E-04	-	
ROOF B TRANSFER FUNCTIONS (BNR))			
.000 .181E-05 .272E-04	.898E-04	.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR))			
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)	0.0000001	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	O.O.	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0.	000000E+0	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST,	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	ISK (MND, NI	ND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	0		
DAYTIME SKY LIGHT U BTU/SQFT-HR	-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKYU	IN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPAC	E (FAP)	4.100000E	-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

KW		- BTU/HR -			
		PEOPLE	PEOPLE		
LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
11.	21850.	12250.	7750.		0002110
H	OURLY FRACT	TION OF PE	CAK		
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000		76.0
.100	.000	.000	.000		76.0
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000		76.0
.800	.500	.800	.800		76.0
1.000	.800	1.000	1.000	70.0	76.0
	LIGHTS 11 HO .100 .100 .100 .100 .100 .100 .100 .800	LIGHTS PROCESS: 11. 21850. HOURLY FRACT .100 .000 .100 .000 .100 .000 .100 .000 .100 .000 .100 .000 .100 .000 .800 .500	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE 11. 21850. 12250. HOURLY FRACTION OF PE .100 .000 .000 .100 .000 .000 .100 .000 .0	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT 11. 21850. 12250. 7750. HOURLY FRACTION OF PEAK100 .000 .000 .000 .100 .000 .000 .000	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT HEATING 11. 21850. 12250. 7750. HOURLY FRACTION OF PEAK100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0

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70.0
                                                             76.0
          1.000
                    .900 1.000 1.000
                            1.000 1.000
                                                 70.0
          1.000
                    .900
                                                            76.0
 10
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                                                            76.0
           .800
                     .800
                             .800
                                      .800
 11
          .500 .500
.800 .800
1.000 .900
1.000 .900
1.000 .900
1.000 .200
.200 .200
.100 .000
                     .500
                              .400
                                       .400
 12
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           .500
                             .800 .800

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1.000 1.000
                                                 70.0
                                                            76.0
 13
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1.000
          1.000
                                                 70.0
                                                            76.0
  14
                                                 70.0
          1.000
                                                            76.0
  15
  16
          1.000
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         1.000
  17
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  18
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  23
           .100
                                                  70.0
                                                            76.0
           .100
                                                  70.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                           65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR STOP TIME HR 24.00000
TEMP (TMXAIR) 55.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
                                24.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
       .191 .200 .286 .300 .369
                                                       .400
                                                                 .451
 .100
                                               .718
 .500
          .537
                   .600
                            .625
                                      .700
                                                        .800
                                                                  .812
 .900
          .906
                   1.00
                            1.00
CHILLER TYPE (ITYPCH)
                             4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)
                                     82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000 .000 .000 .000
                                           .000
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BEACON Energy Analysis By EMC Engineers, Inc. 625WB-5.I

BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	'N				
			SOLAR		DOOR	}			VENT	
			THRU		AND				AND	
MNTF	LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
	.00		7.38	.00	.00	.00	.00	.00	.00	.00
	-61.69	LOSS		-1.12	-8.94	.00	-2.04	-7.11	-73.98	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-48.15	LOSS		93	-7.59	.00	-1.54	-6.06	-62.78	.00
MAR	.99	GAIN	11.72	.00	.00		.02		.00	.03
	-37.21	LOSS		82	-7.05	.00	-1.15	-5.62	-57.07	.00
APR	9.97	GAIN	11.93	.01	.04	.00	.15	.03	.26	1.65
	-13.90	LOSS		46	-4.19	.00	49	-3.35	-31.97	.00
MAY	23.10	GAIN	13.07	.03	.14		.40			6.28
	-1.59	LOSS		23	-2.49	.00	11	-1.92	-18.67	.00
JUN	53.56	GAIN	13.17	.09	.40	.00	.76	.32	2.63	23.30
	.00	LOSS		08	-1.15	.00	.00	88	-7.84	.00
JUL	72.89	GAIN	13.38	.18	1.03	.00	1.07	.82	6.92	32.33
	.00	LOSS		04	71	.00	.00	55	-5.24	.00
AUG	68.40	GAIN	11.73		.77				4.99	31.61
	.00	LOSS		05	79	.00	.00	61	-5.00	.00
SEP	38.70	GAIN	10.12	.05	.39			.32	2.74	17.71
	-2.41	LOSS		21	-1.96	.00	13	-1.54	-14.52	.00
			8.62		.06				.38	
	-10.74	LOSS		51	-4.05	.00	59	-3.15	-29.81	.00
NOV	1.67	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-27.64	LOSS		74	-5.80	.00	-1.16	-4.52	-44.37	.00
DEC	.00	GAIN							.00	
	-59.78	LOSS		-1.11	-8.74	.00	-2.06	-6.88	-70.79	.00
TOT	278.	GAIN	124.						19.	
	-263.	LOSS		-6.	-53.	0.	-9.	-42.	-422.	0.
MAX	HEATING	LOAD=	-25	5026.	BTUH ON	DEC 18	HOUR 4	AMI	BIENT TE	MP 1.
MAX	HEATING COOLING	LOAD=	28:	3015.	BTUH ON	JUL 23	HOUR 14	AMI	BIENT TE	MP 68.

ZONE UA BTU/HR-F 677.5

625WB-5.I

BEACON Energy Analysis By EMC Engineers, Inc.

BLDG 625 - BATTALION HQ INSTALL 9 IN. FIBERGLASS BATT INSULATION

INTERN	ΑL								FAN	TOTAL
		RNAL	SPACE			COIN-	LIGHTING	PROCESS	неат	HEAT GAIN
	TEM	PERAT	URE F			CIDENT		MILLION		
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.		BTU	BTU	BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71	77.		26	17	60.	2.95	11 20		
	,	,,,	69.				2.95	11.38	3.81	21.47
					_					
MAR	71.	77.		12	15	. – -	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12 09	4.08	22.85
			70.				3.11	12.05	4.00	22.65
MAY	75.	78.	70.		15 5	80. 39.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76	78.		13	15	91.	2 26			
501	,	70.	72.		15		3.26	12.57	4.22	23.72
AUG	76.	78.		50		87.	3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.	,	11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.			1.00	22.40
OCT	77	7.0		_						
OCT	/3.	78.	70.	5 28	14 5	77. 31.	3.32	12.81	4.22	24.09
			,	20	,	31.				
NOV	72.	77.		8	15	76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.		12	16	59.	3.20	12.33	4 22	22.25
			69.			0.	3.20	14.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		GOOT TITG				
		COOLING	NUMBER OF H	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WERE	NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OLING	HEATING	COOLING
JAN	615	5	0	0 -	.2510E+06	.0000
FEB	496	5	0	0 -	.2021E+06	.0000
MAR	433	30	0	0 -	.2053E+06	.9755E+05
APR	210	137	0	0 -	.1264E+06	.1486E+06
MAY	34	292	0	0 -	.8351E+05	.1762E+06
NUU	0	404	0	0	.0000	.2358E+06
JUL	0	526	0	0	.0000	.2830E+06
AUG	0	499	0	0	.0000	.2456E+06
SEP	61	324	0	0 -	.8193E+05	.2289E+06
OCT	202	126	0	0 -	.1200E+06	.1754E+06
NOV	385	45	0	0 -	.1681E+06	.1283E+06
DEC	635	0	0	0 -	.2550E+06	.0000
YEAR	3071	2393	0	0 -	.2550E+06	.2830E+06
						3002.

SYSTEM TOTALS

			Y CONSUMPT	ION PROCESS	TO FANS	OTAL INTERNAL HEAT GAIN	MAXIMUM ELECTRIC
	HEATING MILLION	COOLING THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	89.75	.00	3.32	12.81	1.24	24.09	12.6
FEB	70.69	.00	2.95	11.38	1.12	21.47	12.6
MAR	56.51	.09	3.26	12.57	1.24	23.72	20.3
APR	23.13	.83	3.14	12.09	1.20	22.85	23.4
YAM	3.05	1.83	3.32	12.81	1.24	24.09	25.2
JUN	.00	3.99	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.45	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.11	3.32	12.81	1.24	24.09	30.2
SEP	5.09	2.92	3.08	11.86	1.20	22.48	28.7
OCT	19.58	.68	3.32	12.81	1.24	24.09	25.1
NOA	44.77	.14	3.20	12.33	1.20	23.22	22.1
DEC	88.76	.00	3.20	12.33	1.24	23.35	12.6
YEAR	401.34	21.03	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 138522. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. MBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT		S WHEN 1 LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2510E+06
FEB	1464.	929.	1.000	37.	0.	Ο.	0	0	.0000	2021E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9755E+05	2053E+06
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.1486E+06	1264E+06
MAY	2566.	1826.	1.000	65.	Ο.	0.	0	0	.1762E+06	8351E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2358E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2830E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2456E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2289E+06	8193E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.1754E+06	1200E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1283E+06	1681E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2550E+06

10.5

.0

.0

18.0 .0

.0

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BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
                               1.000000
SKY CLEARNESS FACTOR (CLN)
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.0000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
                                                                          1.00
                                          .850
                                                     .850 .850
                                 .850
 .850 .850 .850

    1.00
    1.00
    1.00
    1.00

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 1.00
            1.00
           1.00
                                                                 .850
                                                                           .850
 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
WINDOW GLASS NUMBER (NG)
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
 WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                    WALL DATA
                                               2
                                                         3
 WALL NUMBER
                                                         180.00
                                               90.00
                                                                    -90.00
                                    .00
 AZIMUTH ANGLE (AZ)
                                                                   482.0
 WALL AREA SQFT (AWLL)
                                 1000.0 849.0 1039.0
WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0
                                                                   105.0
                                                                     10.0
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MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.023	.023	.023	.023
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00065	.00065	.00065	.00065
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1			.00000	
N=2	.00006	.00006	.00006	.00006
N=3	.00032	.00032	.00032	.00032
N=4	.00024	.00024	.00024	.00024
N=5	.00024 .00003	.00003	.00003	.00003
N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728	.00728
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 5795	1.00000 -1.71064 .89735 16643 .00728 00002			
ROOF U VALUE BTU/HR-SQFT-F (UR	(F) 3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)		92E-04		
ROOF B TRANSFER FUNCTIONS (BNR	1)			
.000 .181E-05 .272E-04	.898E-04	.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR	2)			
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			0000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00	I		
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	000E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT ((SHSK) 0	.000000E+0	00	_
SUMMER START MONTH AND DAY FOR				
SUMMER END MONTH AND DAY FOR S	SHSK (MND, N	IDND)	1	1
SKY LIGHT AREA SQFT (ASKY) DAYTIME SKY LIGHT U BTU/SQFT-H	U.UUUUUUE+	.00		
DAYTIME SKY LIGHT U BTU/SQFT-E	ודי איניים או מו	-	202000	
	IR-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT FRACTION OF PROCESS HEAT TO IN	-HR-F (SKY	UN)	1.292998	NE - 01

-----INTERNAL GAINS AND PROFILES -----THERMOSTAT SET POINT DEG F - - - - - BTU/HR - - - - -PEOPLE PEOPLE HEATING COOLING LIGHTS PROCESS SENSIBLE LATENT PEAK VAL 11. 21850. 12250. 7750. - - - HOURLY FRACTION OF PEAK - - - -HOUR 70.0 76.0 .000 .000 1 .100 .000 70.0 76.0 .000 2 .100 .000 .000 70.0 76.0 .000 .000 3 .100 .000 .000 70.0 76.0 .000 .100 .000 4 .000 .000 76.0 .100 .000 70.0 5 .000 .000 .100 .000 70.0 76.0 6 .800 .500 .800 .800 70.0 76.0 7 8 1.000 .800 1.000 1.000 70.0 76.0

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1.000
                 .900
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1.000
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70.0
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                                             70.0
                                                       76.0
 16
                        1.000 1.000
                   .800
                                             70.0
                                                       76.0
 17
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 18
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 19
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 21
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 22
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                                    .000
                                              70.0
                                                       76.0
 23
                                    .000
                   .000
                                              70.0
                                                       76.0
 24
          .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
       .191 .200 .286 .300 .369
                                                  .400
                                                         .451
                                                            .812
                 .600
                         .625
                                 .700
                                          .718
                                                  .800
.500
         .537
             1.00
.900
       .906
                        1.00
CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000 .000 .000 .000 .000 .000
.000 .000 .000 .000 .000
                                                            .000
              .000
                                                            .000
                        .000
       .000
.000
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BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITN DOOR AND				VENT AND	
MNTH	LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-61.33	LOSS			0.54	.00	-1.65	-7.11 -	-73.99	.00
	.00	GAIN	9.28		.00	.00	.00	.00	.00	.00
	-47.88	LOSS		93	-7.59	.00	-1.25	-6.06 -	-62.80	.00
	.99	GAIN	11.72	.00	.00	.00	.02	.00	.00	.03
_	-37.02	LOSS		82	-7.05	.00	94	-5.62 -	-57.09	.00
APR	9.97	GAIN	11.93	.01	.04	.00	.12	.03	.26	1.65
-	13.83	LOSS		46	-4.19	.00	40	-3.35 -	-31.97	.00
MAY	23.05	GAIN	13.07	.03	.14	.00	.32	.11	.87	6.28
	-1.58	LOSS		23	-2.49	.00	09	-1.92 -	-18.66	.00
JUN	53.34		13.17	.09	.40	.00	.61	.32	2.63	23.20
	.00	LOSS		08	-1.14	.00	.00	88	-7.82	.00
JUL	72.41		13.38	.18	1.03	.00	.87	.82	6.92	32.04
	.00	LOSS		04	71	.00	.00	55	-5.23	.00
AUG	67.92	GAIN	11.73	.13		.00	.72	.60	4.99	31.30
	.00	LOSS		05		.00		61		.00
	38.58		10.12	.05			.37			17.65
	-2.41			21		.00	10	-1.54 -	14.52	.00
			8.62	.00	.06	.00		.05		2.54
	10.66			51	-4.05	.00	48	-3.15 -	29.83	.00
	1.67		6.92	.00			.00			. 44
	27.45	LOSS		74	-5.80	.00	94	-4.53 -	44.38	.00
	.00		6.45				.00			.00
-	59.40	LOSS		-1.11	-8.74	.00	-1.67	-6.88 -	70.80	.00
	276.		124.	0.	3.	0.	3.	2.	19.	115.
	-262.	LOSS		-6.	-53.	0.	-8.	-42.	-422.	0.
мах н	EATING	LOAD=	-254	152. E	BTUH ON DE	C 18	HOUR 4	ТЯМД	ENT TEM	IP 1
MAX C	OOLING	LOAD=	282	969. E	BTUH ON JU	L 23	HOUR 14	AMBI	ENT TEM	

ZONE UA BTU/HR-F 659.0

BEACON Energy Analysis By EMC Engineers, Inc. 625WB-6.I

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

									FAN TO	TAL
INTERN	AL									
	INTE	RNAL	SPACE		C	COIN-	LIGHTING			
	TEM	PERAT	URE F		C	IDENT			MILLION	
MONTH	AVG.	MAX	MIN	DAY	HR A	MBT.	KWH	BTU	BTU	BTU
JAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	77.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	5	14.				•
MAR	71.	77.				72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.		24	15	81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.				80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
JUN	76.	78.				85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.				91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
									4 22	24.09
AUG	76.	78.					3.32	12.81	4.22	24.09
			71.	25	6	51.				
							2 00	11 06	4.08	22.48
SEP	75.	78.					3.08	11.86	4.00	22.40
			70.	. 15	6	39.				
				_		77.	3.32	12.81	4.22	24.09
OCT	73.	78.		5			3.34	12.61	4.22	24.05
			70.	28	5	31.				
31011	=-	~~		^	15	76	3.20	12.33	4.08	23.22
NOV	72.	77.	69.		15		3.20	12.33	4.00	
			69.	3	6	10.				
DEC	7.0	7-		12	16	59.	3.20	12.33	4.22	23.35
DEC	70.	75.	69.		6		5.20	12.00		
			69.	10	. 6	٠.				

YEAR

38.54 148.46 49.64 280.00

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF I	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	615	5	0	0	2504E+06	.0000
FEB	493	5	0	0	2014E+06	.0000
MAR	431	31	0	0	2047E+06	.9758E+05
APR	209	137	0	0	1260E+06	.1485E+06
MAY	34	292	0	0	8337E+05	.1760E+06
JUN	0	402	0	0	.0000	.2355E+06
JUL	0	521	0	0	.0000	.2830E+06
AUG	0	494	0	0	.0000	.2453E+06
SEP	61	323	0	0	8172E+05	.2287E+06
OCT	201	126	0	0	1197E+06	.1753E+06
NOV	379	45	0	0	1674E+06	.1284E+06
DEC	631	0	0	0	2542E+06	.0000
YEAR	3054	2381	0	0	2542E+06	.2830E+06

SYSTEM TOTALS

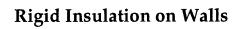
		ENERG	Y CONSUMPT	TOTAL INTERNAL MAXIMUM				
	HEATING	COOLING	LIGHTING	PROCESS MILLION	FANS THOUSAND	HEAT GAIN MILLION	ELECTRIC DEMAND	
MONTH	MILLION BTU	THOUSAND KWH	THOUSAND KWH	BTU	KWH	BTU	KW	
11011111	210	•••••						
JAN	89.38	.00	3.32	12.81	1.24	24.09	12.6	
FEB	70.23	.00	2.95	11.38	1.12	21.47	12.6	
MAR	56.21	.09	3.26	12.57	1.24	23.72	20.3	
APR	23.02	.83	3.14	12.09	1.20	22.85	23.3	
MAY	3.04	1.82	3.32	12.81	1.24	24.09	25.1	
JUN	.00	3.97	3.14	12.09	1.20	22.85	29.5	
JUL	.00	5.41	3.26	12.57	1.24	23.72	33.0	
AUG	.00	5.07	3.32	12.81	1.24	24.09	30.2	
SEP	5.09	2.91	3.08	11.86	1.20	22.48	28.7	
OCT	19.46	.68	3.32	12.81	1.24	24.09	25.1	
NOV	44.24	.14	3.20	12.33	1.20	23.22	22.1	
DEC	88.17	.00	3.20	12.33	1.24	23.35	12.6	
YEAR	398.86	20.92	38.54	148.46	14.55	280.00	33.0	

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 138031. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 12 IN. FIBERGLASS BATT INSULATION

OTHER MONTHLY STATISTICS

!	CLEAR DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
;		HORIZ.					HOURS	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS			M LOADS	COOLING	HEATING
	BTU/	BTU/		MBT.	TEMP. D			MET	LOAD	LOAD
MONTH	SQFT-	SQFT-	PF	DEG.	DEG.		COOL	HEAT	BTU	BTU
MONTA	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2504E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2014E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9758E+05	2047E+06
APR	2312.	1600.	1.000	55.	0.	٥.	0	0	.1485E+06	1260E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1760E+06	8337E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2355E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2830E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2453E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2287E+06	8172E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.1753E+06	1197E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1284E+06	1674E+06
DEC	883.	604.	1.000	35.	Ο.	0.	0	0	.0000	2542E+06



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BLDG 625 - BATTALION HQ INSTALL 3/4 IN. RIGID INSULATION
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1)
                               37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
.850 1.00
1.00 1.00
                                                              .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) . 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                  WALL DATA
                                                       3
WALL NUMBER
AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00 WALL AREA SQFT (AWLL) 1000.0 849.0 1039.0 482.0 WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 105.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 10.5 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 0 0.0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0 .0
AZIMUTH ANGLE (AZ)
                                 .00 90.00 180.00 -90.00
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MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.079	.079	.079	.079
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.00044	.00044	.00044	.00044
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00004	.00004	.00004	.00004
N=1 N=2 N=3 N=4 N=5	.00017	.00017	.00017	.00017
N=5	.00018	.00018	.00018	.00018
N=6	.00005	.00005	.00005	.00005
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 5795.	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	97167	97167	97167	97167
N=5	.19281	.19281	.19281	.19281
N=6	01643	01643	01643	01643
ROOF U VALUE BTU/HR-SQFT-F (URF	3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YE	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.9678	92E-04		
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .181E-05 .272E-04		.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.97 1.36 -	.410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKC	0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	1			
				_
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH	SHSK (MSI,	, NDST)	, <u>,</u>	1 1
SKY LIGHT AREA SQFT (ASKY) 0	OOOOOF+	ן עאכ ער	1	1
DAYTIME SKY LIGHT U BTU/SOFT-HR	-F (SKVII)	1	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKY	JN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPAC	CE (FAP)	4.100000	E-01
		,		

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

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      .900
      1.000
      1.000

      .900
      1.000
      1.000

      .800
      .800
      .800

      .500
      .400
      .400

      .800
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      1.000
      1.000

      .200
      .100
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             1.000
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  11
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                .500
  12
                                                                    70.0
                                                                                    76.0
  13
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70.0
70.0
70.0
  14
               1.000
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  15
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  16
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  19
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  22
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.100 .000 .000 .000
  23
                                                                     70.0
                                                                                   76.0
                                                                     70.0
                                                                                   76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                                           65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START ......

SYSTEM SUPPLY AIR STOP TIME HR 24.00000

TEMP(TMXAIR) 55.000000
                                          0.000000E+00
                                            24.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                      .200
                                  .286 .300 .369
                                                                              .400
                                                                                          .451
 .100
            .191
                           .600
                                        .625
                                                    .700
                                                                              .800
                                                                                           .812
 .500
              .537
                                                                 .718
 .900
             .906
                           1.00
                                       1.00
CHILLER TYPE (ITYPCH)
                                        4
COOLING PLANT RATED OUTPUT BTU (CFLOT)
                                                    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)
                                                   82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
        .000 .000 .000
                                                           .000
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ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

				•	PARTI	TN				
			SOLAR		DOO	R			VENT	
			THRU		AND				AND	
	'H LOAD				SLAB			WINDOW		LATENT
JAN	00.		7.38	.00			.00	.00		
	-65.55	LOSS		-1.12	-8.92	.00	-6.07	-7.10 -	-73.84	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-51.07	LOSS		92	-7.57	.00	-4.69	-6.05 -	-62.58	.00
MAR	. 95	GAIN	11.72	.00	.00	.00	.01	.00	.00	.03
	-39.19	LOSS		82	-7.03	.00	-3.46	-5.60 -	-56.82	.00
APR	9.88	GAIN	11.93	.01	.04	.00	.23	.03	.26	1.68
	-14.60	LOSS		46	-4.18	.00	-1.51	-3.34 -	31.87	.00
MAY	23.54	GAIN	13.07	.03			.93	.11	.87	6.43
	-1.61	LOSS		23	-2.50	.00	28	-1.92 -	18.74	.00
JUN	56.02	GAIN	13.17					.32		
	.00	LOSS		08	-1.16	.00	.00	89	-8.00	.00
JUL		GAIN	13.38		1.02			.82		
	.00	LOSS		05	72	.00	01	56	-5.34	.00
AUG		GAIN	11.73				2.42	.60	4.99	33.26
	.00	LOSS		05	80	.00	.00	61	-5.11	.00
SEP		GAIN	10.12					.32		
	-2.46	LOSS		21	-1.96	.00	34	-1.54 -	14.53	.00
	8.31		8.62					.05		2.51
	-11.49	LOSS		51	-4.03	.00	-1.76	-3.14 -	29.57	.00
	1.55		6.92					.00		.44
	-29.56	LOSS		74	-5.78	.00	-3.49	-4.51 -	44.10	.00
	.00	GAIN	6.45					.00		.00
	-63.79	LOSS		-1.11	-8.72	.00	-6.19	-6.87 -	70.69	.00
TOT	288.		124.	0.	3.	0.	10.	2.	19.	
	-279.	LOSS		-6.	-53.	0.	-28.	-42.	-421.	0.
MAX	HEATING	LOAD=	-261	632 F	ио ните	DEC 18	HOUR 4	TAMA	באי ייבא	MD 1
XAM	HEATING COOLING	LOAD=	283	788. E	BTUH ON	JUL 23	HOUR 14	AMBI	ENT TEM	1P 68.

ZONE UA BTU/HR-F 845.0

BEACON Energy Analysis By EMC Engineers, Inc. 625wr-2.i

FAN TOTAL

BLDG 625 - BATTALION HQ INSTALL 3/4 IN. RIGID INSULATION

INTERN	ΔΤ,								FAN I	OTAL
	INTE	PERAT	URE F		. (COIN- CIDENT	THOUSAND		MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR I	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	77.	69.	4 27		62. 4.	3.32	12.81	4.22	24.09
FEB	71.	76.	69.	26 2		60. 14.	2.95	11.38	3.81	21.47
MAR	71.	7 7.	69.			72. 15.	3.26	12.57	4.22	23.72
APR	73.	77.	70.				3.14	12.09	4.08	22.85
MAY	75.	78.	70.	15 11		80. 39.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.			85. 57.	3.14	12.09	4.08	22.85
JUL	77.	78.	73.	13 10		91. 60.	3.26	12.57	4.22	23.72
AUG	76.	78.	71.	30 25		87. 51.	3.32	12.81	4.22	24.09
SEP	7 5.	78.	70.	3 15	13 6	89. 39.	3.08	11.86	4.08	22.48
OCT	73.	78.	70.	5 28			3.32	12.81	4.22	24.09
NOA	71.	77.	69.	8		76. 18.	3.20	12.33	4.08	23.22
DEC	70.	75.	69.			59. 0.	3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
				_		
JAN	626	4	0	0 -	2560E+06	.0000
FEB	512	2	0	0 -	2075E+06	.0000
MAR	447	29	0	0 -	2096E+06	.9517E+05
APR	222	137	0	0 -	1291E+06	.1489E+06
MAY	34	299	0	0 -	8413E+05	.1771E+06
JUN	0	427	0	0	.0000	.2379E+06
JUL	0	560	0	0	.0000	.2838E+06
AUG	0	530	0	0	.0000	.2474E+06
SEP	62	335	0	0 -	8299E+05	.2315E+06
OCT	209	124	0	0 .	1224E+06	.1758E+06
NOV	401	43	0	0 .	1731E+06	.1262E+06
DEC	647	0	0	0 -	2616E+06	.0000
YEAR	3160	2490	0	0 -	2616E+06	.2838E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	94.28	.00	3.32	12.81	1.24	24.09	12.6
FEB	74.41	.00	2.95	11.38	1.12	21.47	12.6
MAR	59.18	.08	3.26	12.57	1.24	23.72	20.2
APR	24.50	.82	3.14	12.09	1.20	22.85	23.4
MAY	3.08	1.86	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.18	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.74	3.26	12.57	1.24	23.72	33.1
AUG	.00	5.35	3.32	12.81	1.24	24.09	30.4
SEP	5.19	3.02	3.08	11.86	1.20	22.48	28.8
OCT	20.62	.67	3.32	12.81	1.24	24.09	25.1
NOV	47.38	.13	3.20	12.33	1.20	23.22	22.0
DEC	93.39	.00	3.20	12.33	1.24	23.35	12.6
YEAR	422.02	21.86	38.54	148.46	14.55	280.00	33.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 142583. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY SOLAR	ACTUAL SOLAR								
	INSOL.	INSOL.								
1	HORIZ.	HORIZ.					HOUR	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/		MBT.	TEMP. D		NOT	MET	LOAD	LOAD
MONTHIN	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2560E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2075E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.9517E+05	2096E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1489E+06	1291E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.1771E+06	8413E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2379E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2838E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2474E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2315E+06	8299E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1758E+06	1224E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1262E+06	1731E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2616E+06

.0 .0

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BLDG 625 - BATTALION HQ INSTALL 1 IN. RIGID INSULATION
  ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 ******REAL WEATHER FROM DISK******
  FILE NAME SPRNGFMO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                                    37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                        1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                          56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
 FLOOR AREA (SQFT) 5795.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
 INFILTRATION PROFILE

    .850
    .850
    .850
    .850
    .850

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    .850
    .850
    .850

                      .850
                                                                .850 .850 1.00
1.00 1.00 1.00
.850 .850 .850
 A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
 BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) · 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
WALL DATA
WALL NUMBER

1 2 3
AZIMUTH ANGLE (AZ) .00 90.00 180.00
WALL AREA SQFT (AWLL) 1000.0 849.0 1039.0
WINDOW AREA SQFT (AWND) 135.0 90.0 180.0
WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0
WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0
WIDTH OF OVERHANG (WOH) .0 .0 .0
OVERHANG HGT ABV WNDW (HOH) .0 .0 .0
                                         WALL DATA
                                                                                -90.00
                                                                               482.0
                                                                              105.0
                                                                              10.0
                                                                               10.5
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.069	.069	.069	.069
WALL TRANSFER FUNCTIONS				
WALL TRANSFER FUNCTIONS CN FACTORS NUMBER OF BN FACTORS (NB BN FACTORS BN (BN)	.00039	.00039	.00039	.00039
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND) DN FACTORS	.00000	.00000	.00000	.00000
N=3	.00004	.00004	.00004	.00004
N=4	.00015	.00015	.00015	.00015
N=5	.00016	.00016	.00016	.00016
N=6	.00004	.00004	.00004	.00004
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4 N=5	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	97167	97167	97167	97167
N=5	.19281	.19281	.19281	.19281
N=6	01643	01643	.19281 01643	01643
ROOF AREA SQFT (AROF) 5795.	.000000			
ROOF U VALUE BTU/HR-SQFT-F (URF	3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YF	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.9678	92E-04		
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .181E-05 .272E-04	.898E-04	.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.97 1.36 -	.410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			0000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO	0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	1			
SKILIGHT SHADING COEFFICIENT (S	HSK) 0	.000000E+0	10	
SUMMER START MONTH AND DAY FOR	SHSK (MST	,NDST)	1	1
SUMMER END MONTH AND DAY FOR SH SKY LIGHT AREA SQFT (ASKY) 0	ISK (MND, N.	DND)	1	1
DAYTIME SKY LIGHT U BTU/SQFT-HR	-E /CVVIII	· · · · · · · · · · · · · · · · · · ·	202000	
NIGHT TIME SKYLIGHT U BTU/SQFT-	r (301U) .uvs) q_du.	Ι.	1 202000	
FRACTION OF PROCESS HEAT TO INT	ALK-P (BKI)	CE (EVD)	4 100000	E 01
	TIGITAL SPA	CH (FMP)	4.100000	E-OT

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR - PEOPLE	PEOPLE		
	LIGHTS	PROCESS S		LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

9	1.000	.900	1.000	1.000	70.0	76	. 0
10	1.000	.900	1.000	1.000	70.0	76	. 0
11	.800	.800	.800	.800	70.0	76	. 0
12	.500	.500	.400	.400	70.0	76	. 0
13	.800	.800	.800	.800	70.0	76	. 0
14	1.000	.900	1.000	1.000	70.0	76	. 0
15	1.000	.900	1.000	1.000	70.0	76	. 0
16	1.000	.900	1.000	1.000	70.0	76	. 0
17	1.000	.800	1.000	1.000	70.0	76	. 0
18	.200	.200	.100	.100	70.0	76	. 0
19	.100	.000	.000	.000	70.0	76	. 0
20	.100	.000	.000	.000	70.0	76	. 0
21	.100	.000	.000	.000	70.0	76	. 0
22	.100	.000	.000	.000	70.0	76	. 0
23	.100	.000	.000	.000	70.0	76	. 0
24	.100	.000	.000	.000	70.0	76	. 0
NO HEAT	ING ABOVE AMB	IENT TEMP	. OF (THLK	OT) 65	.000000		
NO COOL	ING BELOW AMB	IENT TEMP	OF (TCLK	OT) 65	.000000		
SYSTEM	TYPE, (IECN)	2	2				
SUPPLY .	AIR CFM (SACF	M) 9430	0.00000				
ECONOMI	ZER HIGH TEMP	LIMIT F	68.0	00000			
SYSTEM	SUPPLY AIR ST	ART TIME F	HR 0.00	0000E+00			
	SUPPLY AIR ST			.000000			
	MIXED AIR TEM			00000			
MIN OUT	SIDE AIR FRAC			1.0000	00E-01		
	ICIENCY (EFAN	•	0000E-01				
	AL PRESSURE I			.250000E-01			
	PLANT RATED						
	PLANT RATED			342500.000			
	PLANT PART L						4
.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				
	TYPE (ITYPCH		4	250000 00	0000		
	PLANT RATED						
	PLANT RATED						
	PLANT PART L					000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	ľN				
			SOLAR		DOOF	3			VENT	
			THRU		AND				AND	
MNTH	I LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-64.83	LOSS		-1.12	-8.92	.00	-5.32	-7.10	-73.86	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-50.53	LOSS		92	-7.57	.00	-4.12	-6.05	-62.61	.00
MAR	.95	GAIN	11.72				.01			.03
	-38.81	LOSS		82	-7.03	.00	-3.04	-5.61	-56.86	.00
APR	9.87	GAIN	11.93						.26	
	-14.47	LOSS		46	-4.18	.00	-1.32	-3.34	-31.89	.00
MAY	23.47	GAIN	13.07	.03	.14	.00	.82	.11	.87	6.43
	-1.60	LOSS		23	-2.50	.00	25	-1.92	-18.72	.00
JUN	55.57	GAIN	13.17	.09	.40	.00	1.76	.32	2.63	24.48
	.00	LOSS		08	-1.16	.00	.00	89	-7.97	.00
JUL	75.94	GAIN	13.38	.18	1.02	.00	2.57	.82	6.91	33.98
	.00	LOSS		05	72	.00	.00	56	-5.32	.00
AUG	71.03	GAIN	11.73						4.99	33.11
	.00	LOSS		05	80	.00	.00	61	-5.09	.00
SEP	39.69	GAIN	10.12	.05	.39	.00	1.02	.32	2.74	18.27
	-2.46	LOSS		21	-1.96	.00	30	-1.54	-14.53	.00
OCT	8.32	GAIN	8.62						.38	
	-11.35	LOSS		51	-4.03	.00	-1.55	-3.14	-29.61	.00
NOV	1.57	GAIN	6.92	.00	.00	.00	.00	.00	.00	.44
	-29.20	LOSS		74	-5.78	.00	-3.07	-4.51	-44.14	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.00	.00	.00	.00
	-63.05	LOSS		-1.11	-8.73	.00	-5.43	-6.87	-70.71	.00
TOT	286.	GAIN	124.	0.	3.	0.	9.	2.	19. -421.	121.
	-276.	LOSS			-53.	0.	-24.	-42.	-421.	0.
MZY	неаттис	T'U Z D-1	-26	0248	втин ом	DEC 18	HOUR 4	ΔMF	BIENT TE	MP 1
									BIENT TE	

ZONE UA BTU/HR-F 812.3

BEACON Energy Analysis By EMC Engineers, Inc. 625WR-3.I

									FAN TO	TAL
INTERNA		DNINT.	CDACE		_	OIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
			URE F			IDENT				MILLION
MONTH					HR A	MBT.	KWH	BTU	BTU	BTU
							2 20	10 01	4 22	24.09
JAN	70.	77.	69.	4 27		62. 4.	3.32	12.81	4.22	24.09
			69.	21	0	τ.				
FEB	71.	76.		26	17	60.	2.95	11.38	3.81	21.47
			69.	2	6	14.				
** * * * * * * * * *	77	77		12	15	72.	3.26	12 57	4.22	23.72
MAR	/1.	//.	69.				3.20	12.5,	1.22	
				_						
APR	73.	77.		27	15	74.	3.14	12.09	4.08	22.85
			70.	1	1	33.				
MAY	75	78.		15	15	80.	3.32	12.81	4.22	24.09
PAT	75.	,	70.			39.	3732			
JUN	76.	78.				85.	3.14	12.09	4.08	22.85
			71.	17	6	5/.				
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
						0.77	2 22	12.81	4.22	24.09
AUG	76.	78.	71.			87. 51.	3.32	12.01	4.22	24.09
			,	23	Ū	31.				
SEP	7 5.	78.		3		89.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73	78.		5	14	77.	3.32	12.81	4.22	24.09
001	,,,	,	70.	_						
										00.00
NOV	71.	77.		8		76. 18.	3.20	12.33	4.08	23.22
			69.	3	•	10.				
DEC	70.	75.	•	12	16	59.	3.20	12.33	4.22	23.35
			69.	18	<i>'</i> 6	0.				
*****							39 54	148 46	49.64	280 00
YEAR							30.34	T#0.40	49.07	200.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF H	HOURS WHE	MUMIXAM V	LOADS
		INCLUDING	LOADS WERE	E NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	622	4	0	0	2549E+06	.0000
FEB	510	3	0	0	2064E+06	.0000
MAR	444	29	0	0	2087E+06	.9548E+05
APR	219	136	0	0	1286E+06	.1488E+06
MAY	34	299	0	0	8396E+05	.1769E+06
JUN	0	422	0	0	.0000	.2374E+06
${ m JUL}$	0	554	0	0	.0000	.2837E+06
AUG	0	527	0	0	.0000	.2470E+06
SEP	62	334	0	0	8273E+05	.2311E+06
OCT	205	125	0	0	1220E+06	.1757E+06
NOV	398	43	0	0	1721E+06	.1265E+06
DEC	644	0	0	0	2602E+06	.0000
YEAR	3138	2476	0	0	2602E+06	.2837E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	TION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	93.32	.00	3.32	12.81	1.24	24.09	12.6
FEB	73.78	.00	2.95	11.38	1.12	21.47	12.6
MAR	58.66	.08	3.26	12.57	1.24	23.72	20.2
APR	24.22	.82	3.14	12.09	1.20	22.85	23.4
MAY	3.07	1.86	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.15	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.69	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.32	3.32	12.81	1.24	24.09	30.3
SEP	5.18	3.00	3.08	11.86	1.20	22.48	28.8
OCT	20.26	.67	3.32	12.81	1.24	24.09	25.1
NOV	46.88	.14	3.20	12.33	1.20	23.22	22.0
DEC	92.47	.00	3.20	12.33	1.24	23.35	12.6
YEAR	417.84	21.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 141778. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

(CLEAR									
	DAY SOLAR	ACTUAL SOLAR								
	INSOL.	INSOL.								
		HORIZ.					HOUR	S WHEN	MUMIXAM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/	A	MBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2549E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2064E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.9548E+05	2087E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1488E+06	1286E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.1769E+06	8396E+05
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.2374E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2837E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2470E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2311E+06	8273E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1757E+06	1220E+06
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.1265E+06	1721E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2602E+06

BLDG 625 - BATTALION HQ INSTALL 1.5 IN. RIGID INSULATION ----- PROGRAM CONTROL OPTIONS -----COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA -----*****REAL WEATHER FROM DISK****** FILE NAME SPRNGFMO STATION 13995 YEAR 1955 SITE LATITUDE DEG (AL1) 37.750000 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 9.00000E-03 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000 FLOOR AREA (SOFT) 5795.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000 INFILTRATION PROFILE .850 .850 .850 .850 .850 1.00 1.00 1.00 1.00 1.00 1.00 .850 .850 .850 .850 .850 .850 .850 .850 .850 1.00 1.00 1.00 1.00 .850 .850 1.00 A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 49.200000 WINDOW GLASS NUMBER (NG) DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01 WINDOW SHADING FACTOR (SHD) 6.200000E-01

WALL DATA

	***************************************	• •		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.00031	.00031	.00031	.00031
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND) DN FACTORS	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00003	.00003	.00003	.00003
N=4	.00012	.00012	.00012	.00012
N=5	.00013	.00013	.00013	.00013
N=6	.00003	.00003	.00003	.00003
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 5795.	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	97167	97167	97167	97167
N=5	.19281	.19281	.19281	.19281
N=6	01643	01643	01643	01643
ROOF AREA SQFT (AROF) 5795.	000000			
ROOF U VALUE BTU/HR-SQFT-F (URF	3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YF	S, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.9678	92E-04		
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .181E-05 .272E-04	900F 04	671E-04	1075 04	
		.0715-04	.12/E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 -	.410	.534E-01		
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT)	.410	.534E-01 E+00	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES	.410 0.000000 (AZSK)	.534E-01 E+00 9999.000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0	.410 0.000000 (AZSK) 00000E+00	.534E-01 E+00 9999.000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00	.410 0.000000 (AZSK) 00000E+00	.534E-01 E+00 9999.000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKO	.410 0.000000 (AZSK) 00000E+00 0000E+00 W) 0.00	.534E-01 E+00 9999.000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT	.410 0.0000000 (AZSK) 00000E+00 0000E+00 W) 0.00 FT (SKOH)	.534E-01 E+00 9999.000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS)	.410 0.0000000 (AZSK) 00000E+00 0000E+00 W) 0.00 FT (SKOH)	.534E-01 E+00 9999.000 00000E+00 0.0000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	.410 0.0000000 (AZSK) 00000E+00 0000E+00 W) 0.00 FT (SKOH) 1 HSK) 0	.534E-01 E+00 9999.000 00000E+00 0.0000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKO OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S SUMMER START MONTH AND DAY FOR	.410 0.0000000 (AZSK) 00000E+00 0000E+00 W) 0.00 FT (SKOH) 1 HSK) 0 SHSK (MST	.534E-01 E+00 9999.000 00000E+00 0.0000	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH	.410 0.0000000 (AZSK) 00000E+00 W) 0.00 FT (SKOH) 1 HSK) 0 SHSK (MST SK (MND,NI	.534E-01 E+00 9999.000 00000E+00 0.0000 .00000E+0	250E-02	1
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH SKY LIGHT AREA SQFT (ASKY) 0	.410 0.000000 (AZSK) 00000E+00 W) 0.00 FT (SKOH) 1 HSK) 0 SHSK (MST SK (MND,NI .000000E+0	.534E-01 E+00 9999.000 00000E+00 0.0000 .00000E+0	250E-02	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKO OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH SKY LIGHT AREA SQFT (ASKY) 0 DAYTIME SKY LIGHT U BTU/SOFT-HR	.410 0.0000000 (AZSK) 00000E+00 0000E+00 W) 0.00 FT (SKOH) 1 HSK) 0 SHSK (MST SK (MND,NI .000000E+0	.534E-01 E+00 9999.000 00000E+00 0.0000 .000000E+0 ,NDST) DND)	250E-02 0000 000E+00 00 1	
ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH SKY LIGHT AREA SQFT (ASKY) 0	.410 0.0000000 (AZSK) 00000E+00 W) 0.00 FT (SKOH) 1 HSK) 0 SHSK (MST SK (MND,NI .000000E+0	.534E-01 E+00 9999.000 00000E+00 0.0000 .00000E+0 ,NDST) DND) 00 1.	250E-02 0000 000E+00 1 1 292998 1.292998	1

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3 .	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
1.000 1.000
1.000 1.000
                                                         76.0
                                              70.0
                 .900
         1.000
 9
                                                         76.0
                                              70.0
                  .900
         1.000
 10
                                                         76.0
                          .800
                                   .800
                                              70.0
          .800
                   .800
 11
                                   .400
                                              70.0
                                                         76.0
                           .400
                   .500
          .500
 12
                                                       76.0
                           .800
                                               70.0
                                    .800
                   .800
          .800
 13
                                                         76.0
                        1.000 1.000
                                               70.0
                   .900
         1.000
 14
                                                         76.0
                                               70.0
                        1.000 1.000
                   .900
         1.000
 15
                        1.000 1.000
                                               70.0
                                                         76.0
         1.000
                   .900
 16
                                               70.0
                                                         76.0
                   .800 1.000 1.000
         1.000
 17
                                               70.0
                                                         76.0
                                   .100
                          .100
                   .200
          .200
 18
                                               70.0
                                                         76.0
                   .000
                                    .000
                           .000
 19
           .100
                                               70.0
                                                         76.0
                                    .000
                           .000
                   .000
 20
           .100
                                                         76.0
                            .000
                                               70.0
                                    .000
                    .000
           .100
 21
                                                         76.0
                                     .000
                                               70.0
                            .000
                    .000
           .100
 22
                                                        76.0
                                               70.0
                            .000
                                     .000
           .100
                    .000
 23
                                     .000
                                               70.0
                                                        76.0
                            .000
           .100
                   .000
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                       65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR
                              0.000000E+00
                              24.000000
SYSTEM SUPPLY AIR STOP TIME HR
SYSTEM MIXED AIR TEMP(TMXAIR)
                              55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
                   5.500000E-01
FAN EFFICIENCY (EFAN)
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                    .400
                                                              .451
                 .200 .286 .300 .369
 .100
         .191
                                   .700
                                            .718
                                                     .800
                                                              .812
                           .625
.500
         .537
                  .600
                           1.00
                  1.00
 .900
         .906
CHILLER TYPE (ITYPCH)
                           4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000 .000 .000 .000 .000
                                                     .000
                                                              .000
                                                              .000
         .000 .000 .000
.000 .000
                          .000
                                    .000
                                            .000
                                                     .000
 .000
         .000
 .000
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ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTIT DOOR AND				VENT AND	
MNT	H LOAD				SLAB	BSMT	WALL	WINDOW		LATENT
	.00		7.38			.00			.00	.00
	-63.81	LOSS		-1.12		.00			73.89	
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-49.76	LOSS		93	-7.58	.00	-3.30	-6.05 -	62.66	.00
MAR	.96	GAIN	11.72	.00	.00	.00	.01	.00	.00	.03
	-38.29	LOSS		82	-7.04	.00	-2.43	-5.61 -	56.92	.00
APR	9.88	GAIN	11.93	.01	.04	.00	.16	.03	.26	1.65
	-14.29	LOSS		46	-4.18	.00	-1.06	-3.34 -	31.91	.00
MAY	23.36	GAIN	13.07	.03	.14	.00	.66	.11	.87	6.40
	-1.60	LOSS		23	-2.49	.00	20	-1.92 -	18.70	.00
JUN	54.91	GAIN	13.17	.09	.40	.00	1.41	.32	2.63	24.11
	.00	LOSS		08	-1.15	.00	.00	89	-7.93	.00
JUL	74.94	GAIN	13.38	.18	1.02	.00	2.06	.82	6.92	33.46
	.00	LOSS		04	72	.00	.00	56	-5.30	.00
AUG	70.06	GAIN	11.73	.13	.77	.00			4.99	32.53
	.00	LOSS		05	79	.00	.00	61	-5.06	.00
SEP	39.42	GAIN	10.12		.39				2.74	
	-2.44	LOSS		21	-1.96	.00	24	-1.54 -	14.52	.00
0.00		~								
			8.62			.00		.05		2.51
	-11.15	LOSS		51	-4.04	.00	-1.24	-3.14 -	29.67	.00
NOTE	1 60	CATH	c 00							
			6.92			.00		.00		.44
	-28.69	LOSS		/4	-5.79	.00	-2.46	-4.51 -	44.21	.00
חפת	.00	CATN	C 15	,	0.0	0.0				
							.00			.00
	-61.99	LUSS		-1.11	-8.73	.00	-4.35	-6.87 -	70.73	.00
ייי∩יי	283.	CAIN	124	^	3.	0	7	_	1.0	
101	-272.		124.	<i>0</i> .	5.	0.	7. -20.	۷.	19.	
	-212.	TO92		-6.	-53.	Ο.	-20.	-42.	-421.	0.
MAY	недетис	-מעט.ד	. 250	ת חפכי	י זאר טוויי	חבר זפ	HOID 4	73 8 4 TO TO	DAM MOS	ъ .
MAY	HEATING COOLING	TOWD=	707	400 B	TOH ON I	TITI JO	HOUR 14	AMDI	ENG GEN	r 1.
· ITAL	COOLING	TOAD=	203	JZ. B	TON ON I	лоп 2 3	HOUR 14	AMRT.	PMI LEW	P 68.

ZONE UA BTU/HR-F 765.8

BEACON Energy Analysis By EMC Engineers, Inc. 625WR-4.I

FAN TOTAL

BLDG 625 - BATTALION HQ INSTALL 1.5 IN. RIGID INSULATION

INTERNA	INTE	PERAT	URE F		•	COIN-	THOUSAND	MILLION	MILLION	HEAT GAIN
MONTH	AVG.	XAM	MIN	DAY	HR I	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	77.	69.	4 27		62. 4.	3.32	12.81	4.22	24.09
FEB	71.	76.	69.	26 2		60. 14.	2.95	11.38	3.81	21.47
MAR	71.	77.	69.	12 3		72. 15.	3.26	12.57	4.22	23.72
APR	73.	77.	70.				3.14	12.09	4.08	22.85
MAY	75.	78.	70.			80. 39.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.			85. 57.	3.14	12.09	4.08	22.85
JUL	77.	78.	73.	13 10		91. 60.	3.26	12.57	4.22	23.72
AUG	76.	78.	71.	30 25		87. 51.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.	3 15			3.08	11.86	4.08	22.48
OCT	73.	78.	70.	5 28	14 5		3.32	12.81	4.22	24.09
NOV	71.	77.	69.	_		76. 18.	3.20	12.33	4.08	23.22
DEC	70.	75.		12			3.20	12.33	4.22	23.35
YEAR			٠,٠	10	·		38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	619	4	0	0	2535E+06	.0000
FEB	505	3	0	0	2049E+06	.0000
MAR	441	29	0	0	2074E+06	.9593E+05
APR	216	136	0	0	1278E+06	.1487E+06
MAY	35	297	0	0	8372E+05	.1765E+06
JUN	0	415	0	0	.0000	.2368E+06
JUL	0	545	0	0	.0000	.2835E+06
AUG	0	516	0	0	.0000	.2465E+06
SEP	62	331	0	0	8234E+05	.2304E+06
OCT	205	125	0	0	1213E+06	.1756E+06
NOV	397	43	0	0	1706E+06	.1269E+06
DEC	640	0	0	0	2583E+06	.0000
YEAR	3120	2444	0	0	2583E+06	.2835E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	92.11	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.76	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.99	.09	3.26	12.57	1.24	23.72	20.2
APR	23.86	.82	3.14	12.09	1.20	22.85	23.4
MAY	3.13	1.85	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.09	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.61	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.24	3.32	12.81	1.24	24.09	30.3
SEP	5.17	2.98	3.08	11.86	1.20	22.48	28.8
OCT	20.09	.67	3.32	12.81	1.24	24.09	25.1
NOV	46.38	.14	3.20	12.33	1.20	23.22	22.0
DEC	91.18	.00	3.20	12.33	1.24	23.35	12.6
YEAR	412.68	21.49	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 140749. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY		AVG. MBT. DEG. F	MAX SYS TEMP. D DEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2535E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2049E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9593E+05	2074E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1487E+06	1278E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.1765E+06	8372E+05
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.2368E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2835E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.2465E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2304E+06	8234E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1756E+06	1213E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1269E+06	1706E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2583E+06

.0

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BLDG 625 - BATTALION HO INSTALL 2 IN. RIGID INSULATION
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN)
NUMBER OF ZONES (NZ) 1
                                      1.000000
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 ******REAL WEATHER FROM DISK******
 FILE NAME SPRNGFMO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE

    1NFILTRATION PROFILE

    .850
    .850
    .850
    .850

    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    .850
    .850

                                                         .850
                                                                   .850
                                                                              1.00
                                                        1.00
                                                                   1.00
                                                                              1.00
                                                                    .850
                                                         .850
                                                                               .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                     WALL DATA
WALL NUMBER
                                     1 2
                                                           3
AZIMUTH ANGLE (AZ)
                                     .00
                                               90.00 180.00 -90.00
                                 .00 90.00 180.00 -90.00
1000.0 849.0 1039.0 482.0
WALL AREA SQFT (AWLL),
WINDOW AREA SQFT (AWND)
WALL AREA SQFT (AWLL)
                                  135.0 90.0 180.0 105.0
WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 WIDTH OF OVERHANG (WOH) .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0
WINDOW HEIGHT FT (WNDH)
                                                                     10.0
                                                                       10.5
                                                                        .0
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MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.046	.046	.046	.046
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00127	.00127	.00127	.00127
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00011	.00011	.00011	.00011
N=3	.00062	.00062	.00062	.00062
N=4	.00047	.00047	.00000 .00011 .00062 .00047	.00047
N=5	.00006	.00006	.00047 .00006 ****	.00006
N=6	******	*****	*****	*****
NUMBER OF DN FACTORS (ND)				
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SOFT (AROF) 5795	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728	.00728
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 5795	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)				
ROOF B TRANSFER FUNCTIONS (BNR				
.000 .181E-05 .272E-04	.898E-04	.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.				
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	000E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT ((SHSK) 0	.000000E+0	00	-
SUMMER START MONTH AND DAY FOR				
SUMMER END MONTH AND DAY FOR S	SHSK (MND,N	(עמעו	Τ.	1
SKY LIGHT AREA SQFT (ASKY) DAYTIME SKY LIGHT U BTU/SQFT-H	0.000000E+	.00	20200	
NIGHT TIME SKYLIGHT U BTU/SQFT-H	IK-F (SKYU)	Т.Т.Т.	1 202000	
FRACTION OF PROCESS HEAT TO IN	-пк-г (БКҮ	UN)	⊥.∠ ∃∠∃∃8	
	ארדים זאוארדיםיתיו			NE_01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

				202112	
KW -		BTU/HR -			
		PEOPLE	PEOPLE		
LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
11.	21850.	12250.	7750.		
HO	OURLY FRACT	CION OF PE	AK		
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000	70.0	76.0
.100	.000	.000	.000	70.0	76.0
.800	.500	.800	.800	70.0	76.0
1.000	.800	1.000	1.000	70.0	76.0
	LIGHTS 11 HO .100 .100 .100 .100 .100 .100 .100 .800	LIGHTS PROCESS S 11. 21850 HOURLY FRACT .100 .000 .100 .000 .100 .000 .100 .000 .100 .000 .100 .000 .100 .000 .800 .500	PEOPLE LIGHTS PROCESS SENSIBLE 11. 21850. 12250 HOURLY FRACTION OF PE .100 .000 .000 .100 .000 .000 .100 .000 .0	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT 11. 21850. 12250. 7750. HOURLY FRACTION OF PEAK100 .000 .000 .000 .100 .000 .000 .000	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT HEATING 11. 21850. 12250. 7750. HOURLY FRACTION OF PEAK100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .100 .000 .000 .000 70.0 .800 .500 .800 .800 70.0

```
70.0
                                                        76.0
                  .900 1.000 1.000
        1.000
                                             70.0
  9
                                                        76.0
                   .900 1.000
         1.000
                                  1.000
 10
                                                        76.0
                          .800
                                             70.0
         .800
                                   .800
                   .800
 11
                           .400
                                    .400
                                             70.0
                                                        76.0
                  .500
          .500
 12
                        .800 .800

1.000 1.000

1.000 1.000

1.000 1.000

1.000 1.000
                                             70.0
                                                        76.0
                  .800
          .800
 13
         1.000
                  .900
                                             70.0
                                                        76.0
 14
                                 1.000
1.000
1.000
.100
.000
                                             70.0
                                                       76.0
                  .900
         1.000
 15
                                             70.0
                                                       76.0
                  .900
         1.000
 16
                                             70.0
                                                       76.0
                  .800
        1.000
 17
                        .100
.000
.000
.000
                                             70.0
                                                       76.0
                  .200
         .200
 18
                                             70.0
                                                       76.0
                  .000
          .100
 19
                                             70.0
                                                       76.0
                  .000
          .100
 20
                                   .000
                                                        76.0
                  .000
          .100
 21
                                   .000
                                               70.0
                                                       76.0
                   .000
 22
          .100
                   .000 .000 .000 70.0
.000 .000 .000 70.0
                                                       76.0
           .100
 23
                                                         76.0
           .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
                                        65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.00000
SYSTEM SUPPLY AIR STOP TIME HR 55.000000
                              24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                   .400 .451
      .191 .200 .286 .300 .369
                                                    .800
                                                             .812
                           .625
                                   .700
                                           .718
         .537
                  .600
 .500
                           1.00
 .900
         .906
                  1.00
CHILLER TYPE (ITYPCH)
                           4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000 .000 .000 .000 .000
                                                   .000
                                                           .000
      .000
                                                             .000
                          .000
                                           .000
                                                    .000
                                   .000
 .000
                  .000
                  .000
                          .000
 .000
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ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	ΓN				
			SOLAR		DOOF	ર			VENT	
			THRU		AND				AND	
MNTE	1 LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-62.85	LOSS		-1.12	-8.93	.00	-3.24	-7.11	-73.94	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-48.99	LOSS		93	-7.58	.00	-2.45	-6.06	-62.72	.00
MAR	. 98	GAIN	11.72		.00		.03			.03
	-37.80	LOSS		82	-7.05	.00	-1.83	-5.62	-57.01	.00
		GAIN	11.93	.01	.04		.23			
	-14.11	LOSS		46	-4.19	.00	78	-3.34	-31.96	.00
MAY	23.33	GAIN	13.07		.14		.63			
	-1.60	LOSS		23	-2.49	.00	17	-1.92	-18.70	.00
JUN	54.09	GAIN	13.17		.40		1.20			
	.00	LOSS		08	-1.15	.00	.00	88	-7.90	00
JUL			13.38		1.02				6.92	
	.00	LOSS		04	71	.00	01	55	-5.27	.00
AUG		GAIN	11.73			.00	1.42	.60	4.99	32.20
	.00	LOSS		05	79	.00	.00	61	-5.04	.00
SEP	39.15		10.12		.39		.72			
	-2.44	LOSS		21	-1.96	.00	20	-1.54	-14.53	.00
	8.43		8.62		.06		.12			
	-10.97	LOSS		51	-4.04	.00	93	-3.15	-29.75	.00
	1.65	GAIN	6.92		.00		.01			.44
	-28.23	LOSS		74	-5.80	.00	-1.84	-4.52	-44.30	.00
					.00		.00			.00
	-60.96	LOSS			-8.73		-3.27		-70.76	.00
TOT	281.		124.	0.	3.	0.	6. -15.	2.	19.	118.
	-268.	LOSS		-6.	-53.	0.	-15.	-42.	-422.	0.
MAY	HEATING	T.OAD=	-25	7749.	втин ом	DEC 18	HOUR 4	AMP	IENT TE	MP 1.
	COOLING									

ZONE UA BTU/HR-F 735.2

BEACON Energy Analysis By EMC Engineers, Inc. 625WR-5.I

									FAN T	OTAL
INTERN		D313.7	a D 3 a D		-	OTN	I TOURING	ppogpgg	III A M	HEAD CAIN
		RNAL :				OIN-		PROCESS		
MONTH		PERATI MAX				IDENT MBT.		MILLION BTU	MILLION BTU	BTU
JAN	70.	77.	69.	4 27		63. 4.	3.32	12.81	4.22	24.09
FEB	71.	76.	69.		17 6	60. 14.	2.95	11.38	3.81	21.47
MAR	71.	77.	69.			72. 15.	3.26	12.57	4.22	23.72
APR	73.	78.	70.	24 14		81. 29.	3.14	12.09	4.08	22.85
MAY	75.	78.	70.	15 11		80. 39.	3.32	12.81	4.22	24.09
מטנ	76.	78.	71.			85. 57.	3.14	12.09	4.08	22.85
JUL	76.	78.	72.	13 10	15 6	91. 60.	3.26	12.57	4.22	23.72
AUG	76.	78.	71.			87. 51.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.	11 15		85. 39.	3.08	11.86	4.08	22.48
OCT	73.	78.	70.	5 28		77. 31.	3.32	12.81	4.22	24.09
NOV	72.	77.	69.	8 3		76. 18.	3.20	12.33	4.08	23.22
DEC	70.	75.	69.	12 18		59. 0.	3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHE	MUMIXAM N	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	618	5	0	0	2531E+06	.0000
FEB	497	4	0	0	2040E+06	.0000
MAR	437	30	0	0	2071E+06	.9744E+05
APR	214	137	0	0	1274E+06	.1489E+06
MAY	34	295	0	0	8396E+05	.1769E+06
JUN	0	408	0	0	.0000	.2366E+06
JUL	0	541	0	0	.0000	.2832E+06
AUG	0	510	0	0	.0000	.2463E+06
SEP	61	328	0	0	8260E+05	.2295E+06
OCT	203	125	0	0	1210E+06	.1756E+06
NOV	392	45	0	0	1700E+06	.1281E+06
DEC	636	0	0	0	2577E+06	.0000
YEAR	3092	2428	0	0	2577E+06	.2832E+06

SYSTEM TOTALS

	HEATING MILLION	COOLING THOUSAND	Y CONSUMPT LIGHTING THOUSAND	ION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
MONTH	BTU	KWH	KWH	ью	KMII	210	••••
JAN	91.09	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.58	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.31	.09	3.26	12.57	1.24	23.72	20.3
APR	23.57	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.06	1.84	3.32	12.81	1.24	24.09	25.2
NUL	.00	4.03	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.57	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.19	3.32	12.81	1.24	24.09	30.3
SEP	5.11	2.96	3.08	11.86	1.20	22.48	28.8
OCT	19.84	.68	3.32	12.81	1.24	24.09	25.1
NOV	45.70	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.96	.00	3.20	12.33	1.24	23.35	12.6
YEAR	407.21	21.32	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139709. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

				0111	LIC PONTI		THITSI	100		
	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. MBT. DEG. F	MAX SYS TEMP. I DEG. +	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2531E+06
FEB	1464.	929.	1.000	37.	0.	Ο.	0	0	.0000	2040E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9744E+05	2071E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1489E+06	1274E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1769E+06	8396E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2366E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2463E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2295E+06	8260E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1756E+06	1210E+06
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.1281E+06	1700E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2577E+06

```
BLDG 625 - BATTALION HQ INSTALL 2.5 IN. RIGID INSULATION
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
******REAL WEATHER FROM DISK******
 FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                            1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
TNITTAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)
                                              -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
                           .850 .850 .850
1.00 1.00 1.00
.850 .850 .850
 .850 .850 .850
                                                  .850 .850
1.00 1.00
                                                                      1.00
          1.00
 1.00
                     1.00
                                                                       1.00
1.00 1.00 1.00
                                                            .850
                                                                       .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
                                          2.165000E-02
B FACTOR IN INFILTRATION EQUATION (CINB)
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.20000
                             49.200000
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
```

	WALL DAT	'A		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	. 0	.0	. 0	. 0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.040	.040	.040	.040
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00022		.00022	
NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00002	.00002	.00000 .00000 .00002 .00009	.00002
N=4	.00009	.00009	.00009	.00009
N=5	.00009 .00009	.00009	.00009	.00009
N=6	.00002	.00002	.00002	.00002
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=1 N=2 N=3 N=4	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	97167	97167	97167	97167
N=5	.19281	.19281	.19281	.19281
N=6	01643	01643	.19281 01643	01643
ROOF AREA SQFT (AROF) 5795	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)			1	
ROOF C TRANSFER FUNCTION (CNR)				
ROOF B TRANSFER FUNCTIONS (BNR)			
.000 .181E-05 .272E-04	.898E-04	.671E-04	.127E-04	
ROOF D TRANSFER FUNCTIONS (DNR)			
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	0000	
SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.0	000000E+00			
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (SHSK) 0	.00000E+0	00	
SUMMER START MONTH AND DAY FOR				
SUMMER END MONTH AND DAY FOR S	HSK (MND,N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-H	R-F (SKYU)	1.	.292998	
NIGHT TIME SKYLIGHT U BTU/SQFT FRACTION OF PROCESS HEAT TO IN	-UD-F (CKY	L DAT 1	1 24244	
				VE 01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR - PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
70.0
                                                       76.0
                  .900
                        1.000 1.000
         1.000
  9
                   .900
                         1.000
                                  1.000
                                             70.0
                                                       76.0
         1.000
 10
                                                       76.0
                   .800
                          .800
                                   .800
                                             70.0
          .800
 11
                           .400
                                   .400
                                             70.0
                                                       76.0
                   .500
          .500
 12
                                   .800
                                             70.0
                                                       76.0
                           .800
          .800
                   .800
 13
                        1.000
1.000
                                             70.0
                                 1.000
         1.000
                   .900
 14
                                             70.0
                                 1.000
         1.000
                   .900
 15
                        1.000
                                 1.000
                                                       76.0
                                             70.0
                   .900
         1.000
 16
                                1.000
                                                       76.0
                                             70.0
                   .800 1.000
         1.000
 17
                         .100
                                  .100
                                              70.0
                                                       76.0
                  .200
         .200
 18
                           .000
                                   .000
                                                       76.0
                  .000
                                              70.0
          .100
 19
                          .000
                                   .000
                                              70.0
                                                       76.0
                   .000
          .100
 20
                                   .000
                           .000
                                              70.0
                                                       76.0
          .100
                   .000
 21
                                   .000
                                                       76.0
                           .000
                                              70.0
                   .000
          .100
 22
                                              70.0
                                                       76.0
                   .000
                           .000
                                   .000
          .100
 23
                         .000 .000
                                            70.0
                                                       76.0
          .100
                  .000
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                            24.000000
                           55.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
         .191 .200 .286 .300 .369
                                                   .400
                                                          .451
.100
                                          .718
                                                   .800
                                                            .812
         .537
                          .625
                                  .700
.500
                 .600
               1.00
.900
         .906
                          1.00
                       4
CHILLER TYPE (ITYPCH)
                                  360000.000000
COOLING PLANT RATED OUTPUT BTU (CFLOT)
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                   .000
.000 .000 .000 .000 .000
                 .000
                         .000
                                  .000
                                          .000
                                                  .000
                                                            .000
 .000
         .000
 .000
                .000
         .000
                         .000
```

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

JAN	H LOAD .00 -62.66	GAIN LOSS		ROOF		.00		.00	VENT AND W INFL .00 -73.94	.00
FEB	.00 -48.90	GAIN LOSS	9.28		.00 -7.58		.00 -2.36			.00
	.98 -37.70	GAIN LOSS	11.72		.00 -7.04		.00 -1.74		.00 -56.99	.03
APR	9.90 -14.09	GAIN LOSS	11.93		.04 -4.19		.12 76		.26 -31.93	1.65 .00
MAY	23.21 -1.59	GAIN LOSS	13.07		.14 -2.49				.87 -18.68	
JUN		GAIN LOSS	13.17		.40 -1.15	.00			2.63 -7.87	23.41
JUL	73.94	GAIN LOSS	13.38		1.02 71	.00	1.48		6.92 -5.27	33.01
AUG		GAIN LOSS	11.73		.77 79		1.22		4.99 -5.03	32.04
SEP	38.99 -2.42	GAIN LOSS	10.12		.39 -1.96		.59 17			17.89
OCT	8.39 -10.92	GAIN LOSS	8.62		-4.04	.00	.06 89	.05 -3.15	.38 -29.74	2.54
		LOSS		74		.00		-4.52	-44.28	.44
	-60.79	LOSS		-1.11	.00 -8.73	.00	-3.11	-6.87	-70.76	.00
TOT	280. -267.		124.	0. -6.	3. -53.	0. 0.	5. -14.	2. -42.	19. -422.	117.
MAX MAX	HEATING COOLING	LOAD= LOAD=	-256 283	043. B 291. B	TUH ON DE	C 18	HOUR 4 HOUR 14	AME AME	BIENT TEM	IP 1. IP 68.

ZONE UA BTU/HR-F 712.9

BEACON Energy Analysis	By EMC Engineers, Inc.	625WR-6.1
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NTERNA	۸Ť								FAN T	JIAD
	INTE	PERAT	URE F		C	OIN- IDENT MBT.		PROCESS MILLION BTU	MILLION	
MONTH	AVG.	MAX	MIIN	DAI						
JAN	70.	77.	69.		16 6		3.32	12.81	4.22	24.09
FEB	71.	76.	69.	26 2		60. 14.	2.95	11.38	3.81	21.47
MAR	71.	77.			15 6	72. 15.	3.26	12.57	4.22	23.72
APR	73.	77.	70.		15 6	81. 29.	3.14	12.09	4.08	22.85
MAY	75.	78.	70.			80. 39.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.		14 6	85. 57.	3.14	12.09	4.08	22.85
JUL	76.	78.	72.			91. 60.	3.26	12.57	4.22	23.72
AUG	76.	78.		30 25	_	87. 51.	3.32	12.81	4.22	24.09
SEP	75.	78.		3 15		89. 39.	3.08	11.86	4.08	22.48
OCT	73.	78.		5	14	77. 31.	3.32	12.81	4.22	24.09
NOV	72.	77.		8		76. 18.	3.20	12.33	4.08	23.22
DEC	70.	75.		12		59. 0.	3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF I	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	618	5	0	0	2518E+06	.0000
FEB	499	4	0	0	2031E+06	.0000
MAR	439	30	0	0	2059E+06	.9644E+05
APR	215	136	0	0	1269E+06	.1485E+06
MAY	35	295	0	0	8344E+05	.1761E+06
JUN	0	406	0	0	.0000	.2361E+06
JUL	0	537	0	0	.0000	.2833E+06
AUG	0	507	0	0	.0000	.2459E+06
SEP	62	327	0	0	8190E+05	.2297E+06
OCT	203	125	0	0	1205E+06	.1754E+06
NOV	391	44	0	0	1690E+06	.1273E+06
DEC	635	0	0	0	2560E+06	.0000
YEAR	3097	2416	0	0	2560E+06	.2833E+06

BEACON Energy Analysis By EMC Engineers, Inc.

625WR-6.I

SYSTEM TOTALS

	HEATING MILLION	ENERG COOLING THOUSAND	Y CONSUMPT LIGHTING THOUSAND	TION PROCESS MILLION	TO FANS THOUSAND	OTAL INTERNAL HEAT GAIN MILLION	ELECTRIC DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	90.89	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.59	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.31	.09	3.26	12.57	1.24	23.72	20.3
APR	23.60	.82	3.14	12.09	1.20	22.85	23.3
MAY	3.12	1.84	3.32	12.81	1.24	24.09	25.1
JUN	.00	4.01	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.53	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.17	3.32	12.81	1.24	24.09	30.2
SEP	5.16	2.94	3.08	11.86	1.20	22.48	28.7
OCT	19.80	.67	3.32	12.81	1.24	24.09	25.1
NOV	45.53	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.72	.00	3.20	12.33	1.24	23.35	12.6
YEAR	406.71	21.22	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139560. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2518E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2031E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9644E+05	2059E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1485E+06	1269E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.1761E+06	8344E+05
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.2361E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.2459E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2297E+06	8190E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1754E+06	1205E+06
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.1273E+06	1690E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	2560E+06

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BLDG 625 - BATTALION HQ INSTALL 3 IN. RIGID INSULATION
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (ICWK) 1
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
 FILE NAME SPRNGFMO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                                 37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                 1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                    56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
 FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
           .850 .850 .850 .850 .850
1.00 1.00 1.00 1.00 1.00
1.00 .850 .850 .850 .850
  . 850
        .850 .850
                                                                   .850 1.00
1.00 1.00
 1.00
 1.00
                                                                   .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                     WALL DATA
WALL DATA

WALL NUMBER

1 2 3 4

AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00

WALL AREA SQFT (AWLL) 1000.0 849.0 1039.0 482.0

WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 105.0

WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0

WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 10.5

WIDTH OF OVERHANG (WOH) .0 .0 .0 .0

OVERHANG HGT ABV WNDW(HOH) .0 .0 .0 .0
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	.035	.035	.035	.035
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00020	.00020	.00020	.00020
CN FACTORS NUMBER OF BN FACTORS (NB	6	6	6	6
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00000	.00000	.00000	.00000
N=3	.00002	.00002	.00002	.00002
N=1 N=2 N=3 N=4 N=5 N=6	.00008	.00008	.00008	.00008
N=5	.00008	.00008	.00008	.00008
N=6	.00002	.00002	.00002	.00002
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
<pre>N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 5795.</pre>	1.00000	1.00000	1.00000	1.00000
N=2	-2.50527	-2.50527	-2.50527	-2.50527
N=3	2.30575	2.30575	2.30575	2.30575
N=4	97167	97167	97167	97167
N=5	.19281	.19281	.19281	.19281
N=6	01643	01643	01643	01643
	.000000			
ROOF U VALUE BTU/HR-SQFT-F (URE	3.70	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YE	F) 3.70 ES, 0=NO)	0000E-02 (IROOF)		
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR)	F) 3.70 ES, 0=NO) 1.9678	0000E-02 (IROOF)		
ROOF TRANS FUNCTIONS USED (1=YE ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR)	F) 3.70 ES, 0=NO) 1.9678	0000E-02 (IROOF) 92E-04	1	
ROOF TRANS FUNCTIONS USED (1=YE ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04	3.70 3.70 ES, 0=NO) 1.9678 .898E-04	0000E-02 (IROOF) 92E-04	1	
ROOF TRANS FUNCTIONS USED (1=YE ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR)	3.70 3.70 3.70 3.70 3.70 3.70 3.70 3.70	0000E-02 (IROOF) 92E-04 .671E-04	1.127E-04	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36	F) 3.70 ES, 0=NO) 1.9678 .898E-04	0000E-02 (IROOF) 92E-04 .671E-04	1.127E-04	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT)	F) 3.70 ES, 0=NO) 1.9678 .898E-04 410 0.000000	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00	1 .127E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK)	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000	1 .127E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK)	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000	1 .127E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 000000E+00	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000	1 .127E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC)	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 000000E+00 00000E+00	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000	1 .127E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC) OVERHANG HEIGHT ABOVE SKYLIGHT	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 000000E+00 00000E+00 DW) 0.0 FT (SKOH)	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000	1 .127E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKCOVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS)	F) 3.70 ES, 0=NO) 1.9678 .898E-04 410 0.000000 (AZSK) 000000E+00 00000E+00 DW) 0.0 FT (SKOH)	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000	1 .127E-04 250E-02 000	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKCOVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 000000E+00 0W) 0.0 FT (SKOH) 1 GHSK) 0	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000	1 .127E-04250E-02 000 00E+00	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC) OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SE) SUMMER START MONTH AND DAY FOR	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 00000E+00 00000E+00 0W) 0.0 FT (SKOH) 1 GHSK) 0 SHSK (MST	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000 00000E+00 0.0000	1 .127E-04250E-02 0000 00E+00	1
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC) OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SE) SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SE	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 00000E+00 0W) 0.0 FT (SKOH) 1 SHSK) 0 SHSK (MST	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .000000E+0 ,NDST)	1 .127E-04250E-02 000 00E+00	1
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC) OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SE) SKYLIGHT SHADING COEFFICIENT (SE) SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SKY LIGHT AREA SQFT (ASKY)	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 00000E+00 0W) 0.0 FT (SKOH) 1 SHSK (MST SK (MND, NE 0.000000E+	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .000000E+0 ,NDST) DND)	1 .127E-04250E-02 000 00E+00 0	
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 - SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKCOVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SECOND STAND STAND DAY FOR SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SKY LIGHT AREA SQFT (ASKY) DAYTIME SKY LIGHT U BTU/SQFT-HR	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 00000E+00 00000E+00 0W) 0.0 FT (SKOH) 1 SHSK (MND,NI 0.00000E+ R-F (SKYU)	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .000000E+0 ,NDST) DND)	1 .127E-04250E-02 000 00E+00 0 1 1	1
ROOF TRANS FUNCTIONS USED (1=YEROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .181E-05 .272E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC) OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SE) SKYLIGHT SHADING COEFFICIENT (SE) SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SKY LIGHT AREA SQFT (ASKY)	F) 3.70 ES, 0=NO) 1.9678 .898E-04410 0.000000 (AZSK) 00000E+00 00000E+00 0W) 0.0 FT (SKOH) 1 SHSK (MND,NI 0.00000E+ R-F (SKYU)	0000E-02 (IROOF) 92E-04 .671E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .000000E+0 ,NDST) DND)	1 .127E-04250E-02 000 00E+00 0 1 1	1

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HC	URLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

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9
         1.000
                  .900
                         1.000
                                1.000
                                              70.0
                                                       76.0
                                 1.000
                         1.000
 10
         1.000
                  .900
                                             70.0
                                                       76.0
                   .800
                          .800
                                  .800
          .800
                                              70.0
                                                       76.0
 11
                          .400
                                   .400
          .500
                   .500
                                             70.0
                                                       76.0
 12
                  .800
                          .800
                                   .800
                                             70.0
          .800
                                                       76.0
 13
         1.000
                  .900
                        1.000 1.000
                                             70.0
                                                       76.0
 14
        1.000
                  .900 1.000 1.000
                                             70.0
                                                       76.0
 15
                  .900 1.000 1.000
                                             70.0
                                                       76.0
 16
        1.000
 17
        1.000
                  .800 1.000 1.000
                                             70.0
                                                      76.0
        .200
                  .200
                         .100
                                  .100
                                             70.0
                                                      76.0
 18
 19
          .100
                  .000
                          .000
                                   .000
                                             70.0
                                                      76.0
                          .000
          .100
                                   .000
 20
                  .000
                                             70.0
                                                      76.0
          .100
                         .000
                  .000
                                             70.0
                                                      76.0
 21
                                   .000
                   .000
          .100
                                             70.0
                                                      76.0
 22
                           .000
                                   .000
          .100
                   .000
                  .000 .000 .000
.000 .000 .000
                           .000
                                                      76.0
                                             70.0
 23
                                          70.0
                                                      76.0
          .100
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                      65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR STOP TIME HR 24.00000 55.000000
SYSTEM SUPPLY AIR START TIME HR
                             0.000000E+00
                            24.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN)
                   5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
.100 .191 .200 .286 .300 .369
                                                 .400
                                                         .451
        .537
                .600
                                         .718
                         .625
                                  .700
                                                  .800
.500
                                                           .812
.900 .906 1.00 1.00 CHILLER TYPE (ITYPCH) 4
                        1.00
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000 .000 .000 .000 .000
                                                 .000
                                                          .000
        .000
                        .000
                                  .000
                                                 .000
 .000
                                         .000
                .000
                                                           .000
        .000
                .000
.000
                        .000
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ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNTH LOAD JAN .00 -62.30	GAIN		ROOF	PARTITN DOOR AND SLAB .00 -8.93		.00	.00		LATENT
FEB .00 -48.63		9.28		.00 -7.59		.00 -2.07			.00
MAR .98 -37.52	GAIN LOSS	11.72		.00 -7.05		.00 -1.53		.00 -57.02	.03
APR 9.91 -14.02	GAIN LOSS	11.93		.04 -4.19		.10 67			1.65 .00
MAY 23.10 -1.59		13.07		.14 -2.49		.41 12			
JUN 53.71	GAIN LOSS	13.17		.40 -1.15	.00	.89		2.63 -7.86	23.35
JUL 73.57	GAIN LOSS	13.38		1.02 71	.00			6.92 -5.26	32.81
AUG 68.75	GAIN LOSS	11.73		.77 79	.00	1.07			31.81
SEP 38.89 -2.42		10.12		.39 -1.96	.00	.51 15		2.74 -14.51	17.85 .00
OCT 8.39 -10.85	GAIN LOSS	8.62		.06 -4.04	.00	.06 78		.38 -29.76	2.54
NOV 1.64 -27.93		6.92		.00 -5.80		.00 -1.54		.00	.44
DEC .00 -60.42		6.45	.00	.00 -8.73		.00 -2.73			.00
TOT 279. -266.		124.		3. -53.	0. 0.	4. -12.	2. -42.	19. -422.	117. 0.
MAX HEATING									

ZONE UA BTU/HR-F 696.4

BEACON Energy Analysis By EMC Engineers, Inc. 625WR-7.I

YEAR

BLDG 625 - BATTALION HQ INSTALL 3 IN. RIGID INSULATION

INTERNAL SPACE TEMPERATURE F MONTH AVG. MAX MIN DAY HR AMBT. CIDENT THOUSAND MILLION BTU BTU JAN 70. 77. 69. 26 17 60. 2.95 11.38 3.81 21.47 FEB 71. 77. 69. 2 5 14. MAR 71. 77. 69. 3 6 15. APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 70. 11 5 39. JUN 76. 78. 71. 17 6 57. JUL 76. 78. 71. 17 6 57. JUL 76. 78. 72. 13 15 91. 3.26 12.57 4.22 23.72 JUL 76. 78. 72. 13 15 91. 3.26 12.57 4.22 23.72										FAN TO	TAL
TEMPERATURE F CIDENT THOUSAND MILLION BTU BTU JAN 70. 77. 4 16 63. 3.32 12.81 4.22 24.09 FEB 71. 77. 26 17 60. 2.95 11.38 3.81 21.47 MAR 71. 77. 12 15 72. 3.26 12.57 4.22 23.72 APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72	INTERNA									**************************************	TIENE CATA
MONTH AVG. MAX MIN DAY HR AMET. KWH BTU BTU JAN 70. 77. 4 16 63. 3.32 12.81 4.22 24.09 FEB 71. 77. 26 17 60. 2.95 11.38 3.81 21.47 69. 2 5 14. MAR 71. 77. 12 15 72. 3.26 12.57 4.22 23.72 69. 3 6 15. APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72										MILLION	MILLION
JAN 70. 77. 4 16 63. 3.32 12.81 4.22 24.09 FEB 71. 77. 26 17 60. 2.95 11.38 3.81 21.47 MAR 71. 77. 12 15 72. 3.26 12.57 4.22 23.72 APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72											
FEB 71. 77. 26 17 60. 2.95 11.38 3.81 21.47 MAR 71. 77. 12 15 72. 3.26 12.57 4.22 23.72 APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72	MONTH	AVG.	MAX	MIIN	DAI	nk F	MADI.	KWII	210		
FEB 71. 77. 26 17 60. 2.95 11.38 3.81 21.47 MAR 71. 77. 69. 12 15 72. 3.26 12.57 4.22 23.72 APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72	.TAN	70.	77.		4	16	63.	3.32	12.81	4.22	24.09
MAR 71. 77. 12 15 72. 3.26 12.57 4.22 23.72 APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72	0.2				27	6	4.				
MAR 71. 77. 12 15 72. 3.26 12.57 4.22 23.72 APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72										2 01	21 47
MAR 71. 77. 12 15 72. 3.26 12.57 4.22 23.72 APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72	FEB	71.	77.					2.95	11.38	3.81	21.47
APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.				69.	2	5	14.				
APR 73. 77. 24 15 81. 3.14 12.09 4.08 22.85 MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.	MAD	71	77		12	15	72.	3.26	12.57	4.22	23.72
MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 70. 11 5 39. JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 71. 17 6 57. JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.	MAIN	/1.	,,,								
MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 70. 11 5 39. JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 71. 17 6 57. JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.											
MAY 75. 78. 15 15 80. 3.32 12.81 4.22 24.09 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.	APR	73.	7 7.		24			3.14	12.09	4.08	22.85
MAY 75. 78. 13 15 30. 3.32 12.02 4.08 22.85 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 71. 17 6 57. JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.				70.	14	6	29.				
MAY 75. 78. 13 15 30. 3.32 12.02 4.08 22.85 JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 71. 17 6 57. JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.			=-		4 -	15	0.0	2 22	12 81	4.22	24.09
JUN 76. 78. 12 14 85. 3.14 12.09 4.08 22.85 JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.	MAY	75.	78.					3.32	12.01	1.2-	
JUL 76. 78. 12 14 65. 3.11 22.05 4.22 23.72 72. 10 6 60.				70.	1.4	7	22.				
71. 17 6 57. JUL 76. 78. 13 15 91. 3.26 12.57 4.22 23.72 72. 10 6 60.	JUN	76.	78.		12	14	85.	3.14	12.09	4.08	22.85
72. 10 6 60.				71.	17	6	57.				
72. 10 6 60.								2.06	10 57	4 22	23 72
	JUL	76.	78.					3.26	12.57	4.22	23.72
				12.	10	0	00.				
AUG 76. 78. 30 14 87. 3.32 12.81 4.22 24.09	AUG	76.	78.		30	14	87.	3.32	12.81	4.22	24.09
71. 25 6 51.				71.	25	6	51.				
OTD 75 70 3 13 89 3 08 11.86 4.08 22.48										4 00	22 40
SEP /5. /8.	SEP	75.	78.		_			3.08	11.86	4.08	22.40
70. 15 6 39.				70.	15	6	39.				
OCT 73. 78. 5 14 77. 3.32 12.81 4.22 24.09	ОСТ	73	78.		5	14	77.	3.32	12.81	4.22	24.09
70. 28 5 31.	001	,,,	, , , , ,		_		31.				
NOV 72. 77. 8 15 76. 3.20 12.33 4.08 23.22	NOV	72.	. 77.					3.20	12.33	4.08	23.22
69. 3 6 18.				69.	3	6	18.				
DEC 70. 75. 12 16 59. 3.20 12.33 4.22 23.35	DEC	7.0	75		1 2	16	59	3.20	12.33	4.22	23.35
69. 18 6 0.	שבכ	70.	. /3.								

38.54 148.46 49.64 280.00

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	COOLING	HEATING	COOLING
JAN	618	5	0	0	2513E+06	.0000
FEB	498	4	0	0	2026E+06	.0000
MAR	438	30	0	0	2055E+06	.9660E+05
APR	214	136	0	0	1266E+06	.1484E+06
MAY	35	292	0	0	8335E+05	.1760E+06
JUN	0	405	0	0	.0000	.2359E+06
JUL	0	. 534	0	0	.0000	.2832E+06
AUG	0	502	0	0	.0000	.2457E+06
SEP	62	326	0	0	8177E+05	.2295E+06
OCT	202	125	0	0 ,	1202E+06	.1754E+06
NOV	388	44	0	0	1685E+06	.1275E+06
DEC	635	0	0	0	2553E+06	.0000
YEAR	3090	2403	0	0	2553E+06	.2832E+06

SYSTEM TOTALS

		ENERG	Y CONSUMPT	'ION	TO	TAL INTERNAL	MUMIXAM
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
MONTH	MILLION BTU	THOUSAND KWH	THOUSAND KWH	MILLION BTU	THOUSAND KWH	MILLION BTU	DEMAND KW
MONTH	ВІО	LWI	KWII	ВІО	KNH	ыо	100
JAN	90.53	.00	3.32	12.81	1.24	24.09	12.6
FEB	71.27	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.08	.09	3.26	12.57	1.24	23.72	20.3
APR	23.48	.82	3.14	12.09	1.20	22.85	23.3
MAY	3.11	1.83	3.32	12.81	1.24	24.09	25.1
JUN	.00	4.00	3.14	12.09	1.20	22.85	29.5
JUL	.00	5.51	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.14	3.32	12.81	1.24	24.09	30.2
SEP	5.15	2.94	3.08	11.86	1.20	22.48	28.7
OCT	19.67	.67	3.32	12.81	1.24	24.09	25.1
NOV	45.19	.14	3.20	12.33	1.20	23.22	22.1
DEC	89.36	.00	3.20	12.33	1.24	23.35	12.6
YEAR	404.85	21.13	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 139188. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

				UID	EK MONTUI	וכי זו	IHIIDI.	ICS		
	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-	A PF	AVG. MBT. DEG.	MAX SYST TEMP. DE DEG.	RIFT F	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2513E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2026E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9660E+05	2055E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1484E+06	1266E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1760E+06	8335E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2359E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2457E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2295E+06	8177E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1754E+06	1202E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1275E+06	1685E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2553E+06

Fiberglass Batt Insulation on Roofs

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BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN)
                                1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1)
                          37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                            70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
                                        9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
.850
                                                        .850
                                              1.00
                                                       1.00
                                                                 1.00
                                                        .850
                                                                  .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.20000
WINDOW GLASS NUMBER (NG) 30
                           49.200000
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                        6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
```

	WALL DAT	A		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	. 0	.0	.0

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	.245	. 243	. 244	244
CN FACTORS	01037	07.000	01000	0.1.000
WALL TRANSFER FUNCTIONS CN FACTORS NUMBER OF BN FACTORS (NB	.01837	.01822	.01829	.01829
BN FACTORS BN (BN)	5	5	Э	5
N=1	00003	00003	00003	00003
N=2	00003	.00003	.00003	.00003
N=1 N=2 N=3 N=4 N=5	01017	01008	01013	.00261
N=4	00498	01000	01012	.01012
N=5	00037	00036	00036	.00496
N=6	******	******	******	******
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS	J		3	J
N=1	1.00000	1.00000	1.00000	1 00000
N=1 N=2 N=3 N=4 N=5	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=6	*****	*****	*****	*****
ROOF AREA SQFT (AROF) 5795	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-01		
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)			_	
ROOF B TRANSFER FUNCTIONS (BNR				
.337E-03 .920E-02 .116E-01		.112E+04	.112E+04	
ROOF D TRANSFER FUNCTIONS (DNR)			
1.00 -1.00 .184	460E-02	999.	999.	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.				
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SKO				
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SI	SHSK (MST	, NDST)	1	1
SUMMER END MONTH AND DAY FOR SI	HSK (MND, N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-HINIGHT TIME SKYLIGHT U BTU/SQFT-	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.100000	E-01

POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS :	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	URLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

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.900 1.000
            1.000
                                             1.000
                                                            70.0
                                                                         76.0
   9
                        .900
                                                           70.0
                                  1.000
                                              1.000
                                                                         76.0
            1.000
  10
                     .800
.500
.800
                                   .800
                                                          . 70.0
                                               .800
                                                                         76.0
  11
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                                                             70.0
                                                                          76.0
  13
              .800
                                                             70.0
                                                                          76.0
            1.000
                                                             70.0
  14
                                                                          76.0
                                                            70.0
           1.000
  15
                                                                          76.0
                                                           70.0
70.0
70.0
70.0
70.0
70.0
           1.000
                                                                         76.0
  16
           1.000
                                                                         76.0
  17
                        .200
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                                              .100
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    70.0

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    70.0

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    70.0

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    .000
    70.0

  21
                                                                         76.0
  22
                                                                         76.0
                                                                         76.0
  23
                                                                         76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR
                                       0.000000E+00
                                      24.000000
SYSTEM SUPPLY AIR STOP TIME HR
SYSTEM MIXED AIR TEMP (TMXAIR) 55.00000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
.100 .191 .200 .286 .300 .369
.500 .537 .600 .625 .700 .718
                                                        .369 .400 .451
.718 .800 .812
         .537
.906
 .500
                       .600
                                  .625
                                              .700
                  1.00
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000 COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000 .000 .000 .000 .000
                                                       .000 .000 .000
.000 .000
           .000
                      .000
                                 .000
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                                              .000
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          .000
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BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTIT DOOR AND				VENT AND	
MNTH	LOAD					BSMT	WALL	WINDOW	INFL	LATENT
	.00								.00	.00
		LOSS		-21.70					-73.20	.00
	20.10									
FEB	.00	GAIN	9.28	.00	.00	.00	.07	.00	.00	.00
	-75.28			-17.90					-61.94	
MAR	.79	GAIN	11.72	. 06	.00	.00	.84	.00	.00	.00
	-59.19				-6.96				-56.03	
	55.15	2000		10.00	0.50	,,,				
A DP	9.40	GATN	11 93	54	.04	. 00	2.51	. 03	.29	1.55
	-23.38		11.55		-4.12				-31.56	
	23.30	БОВВ		3.31						
MAY	23 71	GATN	13.07	1.47	.14	. 00	4.64	.11	.90	5.87
	-3.39								-18.09	
	5.05									
MITL	59.34	GAIN	13.17	2.65	.41	.00	6.97	.32	2.64	24.33
0011	.00	LOSS			-1.15				-8.52	
	•••									
лпь	85.39	GAIN	13.38	4.20	1.02	.00	9.28	.81	6.90	34.79
	.00				71				-5.21	
	• • •									
AUG	78.61	GAIN	11.73	3.27	.77	.00	7.79	.60	4.99	34.36
	03				79	.00	33	60	-5.15	.00
SEP	41.92	GAIN	10.12	1.41	.39	.00	4.57	.32	2.77	18.65
	-4.89				-1.91				-13.99	
OCT	7.44	GAIN	8.62	.21	.06	.00	1.41	.05	.42	2.24
	-20.86			-10.04	-3.90	.00	-5.42	-3.03	-28.12	.00
NOV	1.08	GAIN	6.92	.00	.00	.00	.34	.00	.00	.31
	-47.67	LOSS		-14.41	-5.68	.00	-9.81	-4.43	-43.08	.00
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-94.55	LOSS		-21.56	-8.67	.00	-17.18	-6.82	-70.14	.00
TOT	308.	GAIN							19.	
	-426.	LOSS		-128.	-53.	0.	-83.	-42.	-415.	0.
MAX	HEATING	LOAD=	-27	2020.	BTUH ON	DEC 18	HOUR 12	AMI	BIENT TE	MP 15.
MAX	COOLING	LOAD=	29	6922.	BTUH ON	JUL 26	HOUR 17	AMI	BIENT TE	MP 93.

ZONE UA BTU/HR-F 1935.4

BEACON Energy Analysis By EMC Engineers, Inc. 625R-1.I

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

NTERN	AL								FAN T	UIAL
		RNAL	SPACE			COIN-			HEAT	
	TEM:	PERAT	URE F			CIDENT				
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	76.		4	1	7 62.	3.32	12.81	4.22	24.09
			66.	27	•	74.				
FEB	70.	74.				7 60.	2.95	11.38	3.81	21.47
			68.	2	(5 14.				
MAR	71.	77.		12		69.	3.26	12.57	4.22	23.72
			68.	4	(5 15.				
APR	73.	78.		30		84.	3.14	12.09	4.08	22.85
			69.	9	•	5 30.				
MAY	75.	78.				85.	3.32	12.81	4.22	24.09
			69.	11	•	5 39.				
JUN	76.	78.				5 89.	3.14	12.09	4.08	22.85
			71.	17	(5 57.				
JUL	77.	78.				94.	3.26	12.57	4.22	23.72
			72.	10	•	60.				
AUG	76.	78.				5 95. 7 55.	3.32	12.81	4.22	24.09
			70.	25		/ 55.				
SEP	75.	78.	69.	11 15		5 86. 5 39.	3.08	11.86	4.08	22.48
			69.	15	,	5 59.				
OCT	72.	78.	69.	5 28		5 73. 5 33.	3.32	12.81	4.22	24.09
			05.	20	·	33.				
NOV	71.	77.	69.	8		5 75. 5 18.	3.20	12.33	4.08	23.22
			05.							
DEC	69.	73.	62.			5 59. 5 0.	3.20	12.33	4.22	23.35
			JZ.	10	,					
YEAR							38.54	148.46	49.64	280.00

625R-1.I

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	F HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS W	ERE NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	686	0	24	0	2720E+06	.0000
FEB	584	0	0	0	2719E+06	.0000
MAR	541	21	1	0	2720E+06	.1062E+06
APR	294	132	0	0	1764E+06	.1541E+06
MAY	63	291	0	0	1232E+06	.2042E+06
JUN	0	458	0	0	.0000	.2682E+06
JUL	0	582	0	0	.0000	.2969E+06
AUG	2	557	0	0	2087E+05	.2646E+06
SEP	86	336	0	0	1182E+06	.2529E+06
OCT	298	104	0	0	1637E+06	.1881E+06
NOV	494	25	0	0	2367E+06	.1243E+06
DEC	716	0	18	0	2720E+06	.0000
YEAR	3764	2506	43	0	2720E+06	.2969E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	ION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	130.31	.00	3.32	12.81	1.24	24.09	12.6
FEB	103.79	.00	2.95	11.38	1.12	21.47	12.6
MAR	84.63	.07	3.26	12.57	1.24	23.72	20.8
APR	36.58	.77	3.14	12.09	1.20	22.85	23.7
MAY	6.25	1.84	3.32	12.81	1.24	24.09	27.1
JUN	.00	4.40	3.14	12.09	1.20	22.85	31.9
JUL	.00	6.35	3.26	12.57	1.24	23.72	33.9
AUG	.13	5.85	3.32	12.81	1.24	24.09	31.7
SEP	8.68	3.15	3.08	11.86	1.20	22.48	30.5
OCT	34.17	.60	3.32	12.81	1.24	24.09	26.0
NOV	70.26	.09	3.20	12.33	1.20	23.22	21.9
DEC	129.57	.00	3.20	12.33	1.24	23.35	12.6
YEAR	604.38	23.11	38.54	148.46	14.55	280.00	33.9

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 174785. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 625R-1.I

BLDG 625 - BATTALION HQ BASERUN FOR ROOF INSULATION

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.								
	HORIZ. SURF. BTU/ SQFT-	HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEMP. DIDEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2719E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1062E+06	2720E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1541E+06	1764E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.2042E+06	1232E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2682E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.2969E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2646E+06	2087E+05
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2529E+06	1182E+06
OCT	1437.	953.	1.000	57.	0.	0.	. 0	0	.1881E+06	1637E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1243E+06	2367E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	2720E+06

1.00

1.00

.850

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BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
                                         1158.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
                                    3.500000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                            70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
                                          9.00000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
                                                         .850
                            .850
                                                .850
                                    1.00
                                      .850
 .850 .850 .850
         1.00 1.00 1.00 1.00 1.00
1.00 .850 .850 .850 .850
                                               1.00
                                                        1.00
 1.00
                                                         .850
 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
 PARTITION UA BTU/HR-F (GUA) 0.000000E+00
 DOOR UA BTU/HR-F (DUA) 49.20000
WINDOW GLASS NUMBER (NG) 30
                            49.200000
 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                         6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
```

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	. 0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	.0	.0

WINDOW SHADING FACTOR (SHD) 6.200000E-01

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.245	.243	.244	.244
CN FACTORS	.01837	.01822	.01829	.01829
CN FACTORS NUMBER OF BN FACTORS (NB BN FACTORS BN (BN)	5	5	5	5
N=1	00003	.00003	00003	00003
N=2		.00280		
N=3				
N=4	.00498	.01008 .00494	00496	00496
	00037	.00036	.00436	.00436
N=6	******	.00036 *****	******	.00036
NUMBER OF DN FACTORS (ND)	5	E	5	E
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 5795	1 00000	1 00000	1 00000	1 00000
N=2	-1 50943	-1 50000	-1 E0043	1.00000
N=3	65654	-1.50943 	-1.50943	-1.50943
N=4	- 07415	07415	.03034	.05054
N=5	07415	0/415	07415	07415
N=6	.00212	.00212	.00212	.00212
ROOF AREA SQFT (AROF) 5795	000000		******	*****
ROOF U VALUE BTU/HR-SQFT-F (URI	.000000	00000		
POOF TRANS FINCTIONS HEED /1-VI	r/ 0.// Pr 0.NO\	(TDOOE)	-	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR)	65, U=NO)	(IROOF)	Τ	
ROOF B TRANSFER FUNCTIONS (BNR)		22E-02		
.106E-03 .359E-02 .666E-02		000	1000.04	
ROOF D TRANSFER FUNCTIONS (DNR)		.000	.106E+04	
1.00 -1.09 .227		000	999	
SKYLIGHT TILT DEGREES (TILT)	0 000000	F±00	333.	
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.0			000	
SKYLIGHT WIDTH FT (SKW) 0.00	0000005+00			
SKYLIGHT OVERHANG WIDTH FT (SKO		000005+00		
OVERHANG HEIGHT ABOVE SKYLIGHT			005+00	
SKYLIGHT GLASS NUMBER (NS)		0.0000	001100	
SKYLIGHT SHADING COEFFICIENT (S		00000000	n	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SH	ISK (MND N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.000000E+	00	.	1
DAYTIME SKY LIGHT U BTU/SQFT-HF			292998	
NIGHT TIME SKYLIGHT U BTU/SOFT-	-HR-F (SKY	UN)	1.292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	4 100000	E-01
		(/	1.100000	- UI
•				

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
1.000
                                1.000 70.0
1.000 70.0
.800 70.0
        1.000 .900
 9
                                                       76.0
                 .900
                         1.000
        1.000
 10
                        .800
                                  .800
                                                       76.0
         .800
                 .800
 11
                                   .400
                                             70.0
                                                       76.0
                          .400
                  .500
          .500
 12
                                   .800
                                             70.0
                                                       76.0
                          .800
                  .800
          .800
 13
                       1.000 1.000
                                                       76.0
                                            70.0
                  .900
         1.000
 14
                                            70.0
                                                       76.0
                       1.000 1.000
         1.000
                  .900
 15
                                            70.0
                                                       76.0
                       1.000 1.000
         1.000
                  .900
 16
                                            70.0
                                                       76.0
                        1.000 1.000
                  .800
         1.000
 17
                                                       76.0
                         .100
                                  .100
                                             70.0
                   .200
 18
          .200
                           .000
                                                       76.0
                                             70.0
                                   .000
                   .000
 19
          .100
                                                       76.0
                           .000
                                   .000
                                            70.0
                   .000
          .100
 20
                                                       76.0
                                             70.0
                           .000
                                   .000
                   .000
          .100
 21
                                             70.0
                                                       76.0
                           .000
                                   .000
           .100
                   .000
 22
                                                       76.0
                                   .000
                                             70.0
                          .000
 23
          .100
                   .000
                           .000
                                             70.0
                                                      76.0
                                    .000
          .100
                   .000
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                             24.000000
                             55.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
                   5.500000E-01
FAN EFFICIENCY (EFAN)
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                  .400
                                                          .451
      .191 .200 .286 .300 .369
.100
                                  .700
                                          .718
                                                   .800
                                                            .812
                         .625
.500
                 .600
        .537
               1.00
                          1.00
        .906
 .900
CHILLER TYPE (ITYPCH)
                          4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                          .000 .000
       .000 .000 .000 .000
                                                            .000
 .000
                                                            .000
        .000
                         .000
                                  .000
                 .000
 .000
        .000
                 .000
                          .000
 .000
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76.0

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTIT DOOF AND				VENT AND	
MNT	H LOAD					BSMT	WALL	WINDOW		LATENT
	.00		7.38					.00		
	-89.71	LOSS		-14.79	-8.87			-7.06 -		.00
	.00		9.28					.00		.00
	-69.72	LOSS		-12.20	-7.51	.00	-12.81	-5.99 -	62.03	.00
MAR	.80	GAIN			.00		.82	.00	.00	.00
	-54.35	LOSS		-10.88	-6.97	.00	-10.25	-5.56 -	56.18	.00
		GAIN			.04			.03		
	-20.99	LOSS		-6.28	-4.14	.00	-5.01	-3.30 -	31.69	.00
MAY	24.05	GAIN	13.07	.79	.14	.00	4.60	.11	.88	6.12
	-2.75	LOSS		-3.60	-2.47	.00	-2.08	-1.90 -	18.44	.00
JUN	59.68	GAIN	13.17	1.56	.40	.00	6.95	.32	2.63	24.86
	.00	LOSS		-1.75	-1.17	.00	59	90	-8.65	.00
JUL	85.54	GAIN	13.38	2.64	1.02	.00		.81		
	.00	LOSS		-1.14	72	.00	28	56	-5.32	.00
AUG	78.91	GAIN	11.73	1.99	.77	.00	7.78	.60	4.99	35.17
	.00	LOSS		-1.26	80	.00	34	61	-5.21	.00
SEP	42.56	GAIN	10.12	.80	.39	.00	4.55	.32	2.76	19.26
	-4.13	LOSS		-3.18	-1.93	.00	-1.88	-1.52 -	14.17	.00
		GAIN	8.62					.05		
	-18.43	LOSS		-6.84	-3.93	.00	-5.48	-3.06 -	28.44	.00
		GAIN	6.92	.00	.00	.00	.33	.00	.00	.34
	-43.46	LOSS		-9.84	-5.70	.00	-9.85	-4.45	43.28	.00
								.00		.00
	-87.89	LOSS		-14.70	-8.68	.00	-17.21	-6.83 -	70.28	.00
TOT			124.	8.	3.	0.	38.	2.	19.	
	-391.	LOSS		-86.	-53.	0.		-42.	-417.	0.
MAX	HEATING	LOAD=	-27	2020.	BTUH ON	DEC 18	HOUR 11	AM BI	ENT TEM	IP 11.
								AMBI		

ZONE UA BTU/HR-F 1696.1

FAN TOTAL

BEACON Energy Analysis By EMC Engineers, Inc.

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

INTERNAL LIGHTING PROCESS HEAT HEAT GAIN INTERNAL SPACE COIN-THOUSAND MILLION MILLION MILLION CIDENT TEMPERATURE F BTU BTU BTU MONTH AVG. MAX MIN DAY HR AMBT. KWH 24.09 17 62. 3.32 12.81 4.22 70. 76. 4 JAN 67. 7 4. 27 2.95 11.38 3.81 21.47 17 64. 70. 75. 13 FEB 6 14. 69. 2 12.57 4.22 23.72 16 69. 3.26 12 MAR 71. 77. 6 15. 69. 4 22.85 4.08 73. 78. 30 16 84. 3.14 12.09 APR 69. 9 6 30. 24.09 12.81 4.22 16 85. 3.32 MAY 75. 78. 29 69. 11 6 39. 22.85 15 89. 3.14 12.09 4.08 27 JUN 76. 78. 6 57. 71. 17 23.72 15 94. 4.22 3.26 12.57 26 77. 78. JUL 72. 6 60. 10 24.09 16 95. 3.32 12.81 4.22 29 AUG 76. 78. 70. 25 7 55. 15 86. 3.08 11.86 4.08 22.48 SEP 75. 78. 11 15 69. 6 39. 15 73. 3.32 12.81 4.22 24.09 5 OCT 72. 78. 69. 28 6 33. 12.33 4.08 23.22 3.20 16 75. NOV 71. 77. 8 6 18. 69. 23.35 3.20 12.33 4.22 16 59. 12 DEC 70. 73. 6 0. 64. 18 280.00 49.64 38.54 148.46 YEAR

625R-2.I

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	680	0	15	0 -	2720E+06	.0000
FEB	567	0	0	0 -	2580E+06	.0000
MAR	52 5	22	0	0 -	2592E+06	.1037E+06
APR	276	136	0	0 -	1657E+06	.1525E+06
MAY	50	304	0	0 -	1139E+06	.1978E+06
JUN	0	470	0	0	.0000	.2611E+06
JUL	0	596	0	0	.0000	.2881E+06
AUG	0	572	0	0	.0000	.2614E+06
SEP	79	349	0	0 -	1097E+06	.2464E+06
OCT	278	108	0	0 -	1537E+06	.1848E+06
NOV	481	28	0	0 .	2227E+06	.1255E+06
DEC	711	0	16	0 .	2720E+06	.0000
YEAR	3647	2585	31	0 -	2720E+06	.2881E+06

SYSTEM TOTALS

	HEATING MILLION	ENERG COOLING THOUSAND	Y CONSUMPT LIGHTING THOUSAND	TION PROCESS MILLION	TO FANS THOUSAND	OTAL INTERNAL HEAT GAIN MILLION	MAXIMUM ELECTRIC DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	122.73	.00	3.32	12.81	1.24	24.09	12.6
FEB	96.92	.00	2.95	11.38	1.12	21.47	12.6
MAR	78.75	.07	3.26	12.57	1.24	23.72	20.7
APR	33.36	.79	3.14	12.09	1.20	22.85	23.6
MAY	5.01	1.87	3.32	12.81	1.24	24.09	26.7
JUN	.00	4.43	3.14	12.09	1.20	22.85	31.4
JUL	.00	6.37	3.26	12.57	1.24	23.72	33.4
AUG	.00	5.88	3.32	12.81	1.24	24.09	31.4
SEP	7.61	3.21	3.08	11.86	1.20	22.48	30.2
OCT	30.77	.62	3.32	12.81	1.24	24.09	25.7
NOV	65.29	.10	3.20	12.33	1.20	23.22	21.9
DEC	122.09	.00	3.20	12.33	1.24	23.35	12.6
YEAR	562.52	23.35	38.54	148.46	14.55	280.00	33.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 167701. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 1 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

	CLEAR DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					HOUR	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	ΓΕM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/	j	AMBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2580E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1037E+06	2592E+06
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.1525E+06	1657E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.1978E+06	1139E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2611E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	o	.2881E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2614E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2464E+06	1097E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1848E+06	1537E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1255E+06	2227E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	2720E+06

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BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
******REAL WEATHER FROM DISK******
 FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
                                 .850 .850
 .850
         .850 .850
                                                       .850
                                                                 .850
                                                                            1.00
         1.00 1.00 1.00 1.00 1.00
1.00 .850 .850 .850 .850
 1.00
                                                                 1.00
                                                                            1.00
                                                                  .850
1.00
                                                                             .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                    WALL DATA
                                    1 2
WALL NUMBER
                                                          3
                                                                     4
AZIMUTH ANGLE (AZ)
                                     .00
                                               90.00 180.00 -90.00
WALL AREA SQFT (AWLL) 1000.0 849.0 1039.0 482.0 WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 105.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 10.5 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.245	.243	.244	. 244	
	.01837	.01822	.01829	.01829	
NUMBER OF BN FACTORS (NB	5	5	5	5	
BN FACTORS BN (BN)					
N=1	.00003 .00283 .01017 .00498 .00037	.00003	.00003	.00003	
N=2	.00283	.00280	.00281	.00281	
N=3	.01017	.01008	.01012	.01012	
N=4	.00498	.00494	.00496	.00496	
N=5	.00037	.00036	.00036	.00036	
N=6	*****	*****	*****	*****	
NUMBER OF DN FACTORS (ND)	5	5	5	5	
DN FACTORS					
DN FACTORS N=1 N=2 N=3 N=4 N=5	1.00000	1.00000	1.00000	1.00000	
N=2	-1.50943	-1.50943	-1.50943	-1.50943	
N=3	.65654	.65654	.65654	.65654	
N=4	07415	07415	07415	07415	
N=5	.00212	.00212	.00212	.00212	
N=6	.00212	*****	******	*****	
ROOF AREA SQFT (AROF) 5795	.000000				
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-02			
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1		
ROOF C TRANSFER FUNCTION (CNR)					
ROOF B TRANSFER FUNCTIONS (BNR	2)				
.103E-04 .151E-02 .564E-02	.278E-02	.205E-03	.103E+04		
ROOF D TRANSFER FUNCTIONS (DNF	2)				
1.00 -1.18 .410	444E-01	.500E-03	999.		
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00			
SKYLIGHT AZIMUTH ANGLE DEGREES			000		
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00	1			
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00				
SKYLIGHT OVERHANG WIDTH FT (SP					
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	00E+00		
SKYLIGHT GLASS NUMBER (NS)	1				
SKYLIGHT SHADING COEFFICIENT	(SHSK) 0).000000E+0	0		
		·			
SUMMER START MONTH AND DAY FOR	R SHSK (MST	NDST)	1		
SUMMER END MONTH AND DAY FOR S	R SHSK (MST SHSK (MND,N	(,NDST) IDND)	1	1	
SUMMER END MONTH AND DAY FOR S	R SHSK (MST SHSK (MND,N 0.000000E+	(,NDST) IDND) -00	1		
SUMMER END MONTH AND DAY FOR S SKY LIGHT AREA SQFT (ASKY) DAYTIME SKY LIGHT U BTU/SQFT-F	R SHSK (MST SHSK (MND,N 0.000000E+ HR-F (SKYU)	T,NDST) IDND) -00	1 292998		
SUMMER END MONTH AND DAY FOR S	R SHSK (MST SHSK (MND, N 0.000000E+ HR-F (SKYU) T-HR-F (SKY	T, NDST) IDND) -00 1. TUN)	1 292998 1.292998	1	

	KW -		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HC	URLY FRACT	TION OF PEA	4K		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
1.000 1.000
                                                           76.0
         1.000
                   .900
                                                70.0
          1.000
                    .900
                           1.000 1.000
                                                70.0
                                                           76.0
 10
 11
           .800
                    .800
                            .800
                                     .800
                                                70.0
                                                           76.0
 12
           .500
                    .500
                             .400
                                     .400
                                                70.0
                                                           76.0
                    .800
                            .800
           .800
                                                70.0
                                                           76.0
 13
                                     .800
                         1.000 1.000
1.000 1.000
          1.000
                                                70.0
                                                           76.0
 14
                    .900
                                                70.0
                                                           76.0
 15
          1.000
                    .900
                         1.000 1.000
1.000 1.000
                                                70.0
                                                           76.0
         1.000
 16
                    .900
                         1.000
                                                70.0
                                                           76.0
 17
          1.000
                    .800
                           .100
                                    .100
                                                70.0
                                                           76.0
 18
          .200
                    .200
                    .000
                            .000
                                                70.0
                                                           76.0
           .100
                                      .000
 19
                           .000
                                                70.0
           .100
                    .000
                                      .000
                                                           76.0
 20
                           .000
           .100
                                                70.0
 21
                    .000
                                      .000
                                                           76.0
           .100
                    .000
                            .000
                                                70.0
                                                           76.0
 22
                                      .000
                          .000 .000
                    .000
           .100
                                                           76.0
                                                 70.0
 23
           .100
                    .000
                                                           76.0
                                                 70.0
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                         65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM)
                       9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR
                             0.00000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                               24.000000
SYSTEM MIXED AIR TEMP (TMXAIR)
                              55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN)
                    5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
              .200 .286 .300 .369
                                                     .400
                                                               .451
         .191
.100
         .537
                                    .700
                                            .718
                                                      .800
                                                               .812
 .500
                  .600
                           .625
.900
         .906
                  1.00
                           1.00
CHILLER TYPE (ITYPCH)
                            4
COOLING PLANT RATED OUTPUT BTU (CFLOT)
                                    360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)
                                    82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000
       .000
               .000 .000
                                   .000
                                          .000
                                                      .000
                                                               .000
         .000
                  .000
                           .000
                                    .000
                                             .000
                                                      .000
                                                               .000
 .000
 .000
         .000
                  .000
                           .000
```

625R-3.I

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	N				
			SOLAR		DOOR				VENT	
			THRU		AND				AND	
MNTF	I LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	N INFL	LATENT
	.00		7.38	.00	.00	.00	.00	.00	.00	.00
		LOSS			-8.89		-17.18			
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-65.13	LOSS		-7.40	-7.52	.00	-12.84	-6.01	-62.17	.00
MAR	.88	GAIN	11.72	.05	.00	.00	.80	.00	.00	.02
	-50.50	LOSS		-6.64	-6.99	.00	-10.29	-5.57	-56.44	.00
APR	10.00	GAIN	11.93		.04		2.47			
	-19.27	LOSS		-3.97	-4.15	.00	-5.04	-3.32	-31.87	.00
MAY	24.64		13.07				4.58			
	-2.43	LOSS		-2.49	-2.48	.00	-2.10	-1.91	-18.72	.00
		~~			4.0			2.0		0.4.07
JUN		GAIN	13.17		.40		6.94			
	.00	LOSS		-1.41	-1.17	.00	59	90	-8.64	.00
TITE	84.58	GAIN	12 20	1 02	1.02	0.0	9.26	92	6 90	35 47
001		LOSS	13.30		72		28			
	.00	1000		1.01	. / 2	.00	.20	. 50	2.34	.00
AUG	78.34	GAIN	11.73	1.55	.77	.00	7.77	.60	4.99	34.89
		LOSS			80		34			
SEP	42.70	GAIN	10.12	.72	.39	.00	4.53	.32	2.75	19.17
	-3.70	LOSS		-2.19	-1.95	.00	-1.90	-1.53	-14.36	.00
OCT	8.15	GAIN	8.62	.14	.06	.00	1.37	.05	.40	2.44
	-16.62	LOSS		-4.25	-3.96	.00	-5.54	-3.08	-28.81	.00
			6.92				.32			
	-40.06	LOSS		-5,99	-5.72	.00	-9.90	-4.46	-43.52	.00
DEC	.00	CATN	6.45	0.0	0.0	0.0	.01	0.0	00	.00
	-82.26		0.45		-8.69		-17.24			
	02.20	2000		0.71	0.05		17.21	0.01	70.55	
TOT	310.	GAIN	124.	7.	3.	0.	38.	2.	19.	125.
	-364.			-54.	3. -53.	0.	38. -83.	-42.	-419.	0.
MAX	HEATING	LOAD=	-272	2020. E	TUH ON	DEC 18	HOUR 9	AME	BIENT TE	MP 3.
MAX	COOLING	LOAD=	285	5452. E	TUH ON	JUL 26	HOUR 17	AMI	BIENT TE	MP 93.

ZONE UA BTU/HR-F 1496.7

BEACON Energy Analysis By EMC Engineers, Inc. 625R-3.I

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

TAIMEDAI	7. T								FAN T	OTAL
INTERN		RNAL	SPACE		c	COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND			
MONTH	AVG.	MAX	MIN	DAY				BTU	BTU	BTU
JAN	70.	76.	68.	4 27		62. 4.	3.32	12.81	4.22	24.09
			00.	21	0	4.				
FEB	70.	75.	69.			64. 14.	2.95	11.38	3.81	21.47
			05.	2	0	14.				
MAR	71.	77.				72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73.	78.		30		84.	3.14	12.09	4.08	22.85
			69.	9	6	30.				
MAY	75.	78.		29	16	85.	3.32	12.81	4.22	24.09
			69.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78.		26	15	94.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.		29	15	96.	3.32	12.81	4.22	24.09
			71.	25	7	55.				
SEP	75.	78.		11	15	86.	3.08	11.86	4.08	22.48
			69.	15	6	39.				
OCT	73.	78.		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	73.		12	17		3.20	12.33	4.22	23.35
•			65.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	COOLING	HEATING	COOLING
JAN	671	3	10	•	27227 06	
		1	10	0	2720E+06	.0000
FEB	5 50	0	0	0	2481E+06	.0000
MAR	502	25	0	0	2497E+06	.1068E+06
APR	256	142	0	0	1583E+06	.1545E+06
MAY	45	309	0	0	1087E+06	.1974E+06
JUN	0	470	0	0	.0000	.2595E+06
JUL	0	589	0	0	.0000	.2855E+06
AUG	0	569	0	0	.0000	.2612E+06
SEP	75	350	0	0	1050E+06	.2452E+06
OCT	256	116	0	0	1477E+06	.1855E+06
NOV	463	35	0	0	2129E+06	.1277E+06
DEC	698	0	13	0	2720E+06	.0000
YEAR	3516	2606	23	0	2720E+06	.2855E+06

BEACON Energy Analysis By EMC Engineers, Inc. 625R-3.I

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	ION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	116.26	.00	3.32	12.81	1.24	24.09	12.6
FEB	91.11	.00	2.95	11.38	1.12	21.47	12.6
MAR	73.64	.08	3.26	12.57	1.24	23.72	20.9
APR	30.65	.82	3.14	12.09	1.20	22.85	23.7
MAY	4.46	1.92	3.32	12.81	1.24	24.09	26.6
JUN	.00	4.43	3.14	12.09	1.20	22.85	31.3
JUL	.00	6.30	3.26	12.57	1.24	23.72	33.2
AUG	.00	5.84	3.32	12.81	1.24	24.09	31.4
SEP	7.01	3.21	3.08	11.86	1.20	22.48	30.2
OCT	27.89	.65	3.32	12.81	1.24	24.09	25.8
NOV	60.94	.11	3.20	12.33	1.20	23.22	22.1
DEC	115.41	.00	3.20	12.33	1.24	23.35	12.6
YEAR	527.37	23.37	38.54	148.46	14.55	280.00	33.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 161649. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 625R-3.I

BLDG 625 - BATTALION HQ INSTALL 3.5 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.								
	HORIZ. SURF. BTU/ SQFT-	HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2481E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.1068E+06	2497E+06
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.1545E+06	1583E+06
MAY	2566.	1826.	1.000	65.	Ο.	Ο.	0	0	.1974E+06	1087E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2595E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2855E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2612E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2452E+06	1050E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1855E+06	1477E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1277E+06	2129E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2720E+06

WINDOW HEIGHT FT (WNDH)

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BLDG 625 - BATTALION HO INSTALL 6 IN. FB BATT INSUL. ON ROOF
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN)
                                1.000000
NUMBER OF ZONES (NZ)
                             1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME SPRNGFMO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1)
                           37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI)
                                       435.000000
INFILTRATION PROFILE
                             .850 .850
                                                 .850
                                                          .850
                                                                   1.00
 .850 .850 .850
                1.00 1.00 1.00
.850 .850 .850
                                                                   1.00
          1.00
                                               1.00
                                                         1.00
1.00
        1.00
                                       .850
                                                .850
                                                          .850
1.00
                                                                    .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG)
                           30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                               WALL DATA
                                1 2
                                                  3
WALL NUMBER
                               .00
                                         90.00 180.00 -90.00
AZIMUTH ANGLE (AZ)
WALL AREA SQFT (AWLL)
                             1000.0 849.0 1039.0 482.0
                             135.0 90.0 180.0
WINDOW AREA SOFT (AWND)
                                                           105.0
```

10.0

WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 WIDTH OF OVERHANG (WOH) .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0

10.0

10.0

.0

10.0

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0 .245	120.0	120.0	120.0
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.01837	.01822	.01829	.01829
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5 N=6	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	.01008	.01012	.01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=6	******	*****	*****	*****
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=6	*****	*****	******	*****
ROOF AREA SQFT (AROF) 5795	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)	1.9891	66E-04		
ROOF B TRANSFER FUNCTIONS (BNR	.)			
.000 .183E-05 .275E-04		.678E-04	.128E-04	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36			250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00			
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SK	OW) 0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS)		0.0000	00E+00	
SKYLIGHT SHADING COEFFICIENT (CHCK) V	0000000	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR S.				1
SKY LIGHT AREA SQFT (ASKY)	0.000000E+	00	_	-
DAYTIME SKY LIGHT U BTU/SOFT-H	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.100000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					FOINT D	1 24
	KW -	- -	BTU/HR - PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRACT	CION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

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.900 1.000 1.000
                                             70.0
                                                      76.0
        1.000
  9
                                             70.0
                                                      76.0
                  .900 1.000
                                 1.000
        1.000
 10
                                                      76.0
                  .800
                                  .800
                                            70.0
                         .800
         .800
 11
                                   .400
                                                      76.0
                          .400
                                            70.0
                  .500
          .500
 12
                                                      76.0
                           .800
                                   .800
                                            70.0
          .800
                  .800
 13
                        1.000
                                                      76.0
                                            70.0
                 .900
                                 1.000
         1.000
 14
                                 1.000
                                            70.0
                                                      76.0
                 .900
                         1.000
        1.000
 15
                                 1.000
                                            70.0
                                                      76.0
                 .900
                        1.000
        1.000
 16
                                            70.0
                                                     76.0
                         1.000
        1.000
                 .800
                                 1.000
 17
                         .100
                                  .100
                                            70.0
                                                     76.0
        .200
                 .200
 18
                                            70.0
                          .000
                                  .000
                                                     76.0
                 .000
          .100
 19
                        .000
                                            70.0
                                  .000
                                                     76.0
                 .000
          .100
 20
                                            70.0
                                                     76.0
                                  .000
                  .000
          .100
 21
                                            70.0
                                                     76.0
                                  .000
                  .000
 22
          .100
                        .000 .000 70.0
.000 .000 70.0
                                             70.0
                                                     76.0
                  .000
         .100
 23
                                                      76.0
                  .000
 24
          .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
                                      65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                 .400
                                                           .451
 .100 .191 .200 .286 .300 .369
                                                  .800
                                         .718
                                                           .812
                 .600
                                  .700
                         .625
 .500
         .537
                1.00 1.00
H) 4
         .906
 .900
CHILLER TYPE (ITYPCH)
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                 .000 .000
 .000. 000. 000. 000. 000.
                                                  .000
                                                           .000
                         .000
                                         .000
                 .000
                                  .000
         .000
 .000
         .000
                 .000 .000
 .000
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BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	'N				
			SOLAR		DOOR	2			VENT	
			THRU		AND				AND	
MNTF	I LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-76.45	LOSS		-1.13	-8.90	.00	-17.21	-7.08	-73.62	.00
			9.28				.06			.00
	-58.93	LOSS		93	-7.54	.00	-12.89	-6.02	-62.34	.00
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-45.16	LOSS		82	-7.02	.00	-10.33	-5.59	-56.71	.00
APR	10.37	GAIN	11.93	.01	.04	.00	2.43	.03	.27	1.64
		LOSS			-4.19		-5.08	-3.34	-32.11	.00
MAY	25.18	GAIN	13.07	.03	.14	.00	4.54	.11	.87	6.48
	-1.92	LOSS		24	-2.52	.00	-2.16	-1.94	-19.16	.00
JUN	60.38	GAIN	13.17	.09	.40	.00	6.92	.32	2.62	25.55
	.00	LOSS		09	-1.19	.00	62	91	-8.72	.00
JUL	84.51	GAIN	13.38	.18	1.02	.00	9.25	.82	6.90	36.33
	.00	LOSS		05	73	.00	29	57	-5.45	.00
AUG	78.93	GAIN	11.73	.13	.77	.00	7.76	.60	4.98	35.96
	.00	LOSS			81		36			.00
SEP	43.52	GAIN	10.12	.05	.39	.00	4.51	.32	2.74	19.82
	-2.94	LOSS		21	-1.97	.00	-1.94	-1.55	-14.61	.00
OCT	8.73	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-14.07	LOSS		51	-4.00	.00	-5.62	-3.12	-29.31	.00
NOV	1.48	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
	-35.41	LOSS		,75	-5.76	.00	-9.96	-4.49	-43.86	.00
DEC	.00	GAIN			.00		.01	.00	.00	.00
	-74.68	LOSS		-1.12	-8.71	.00	-17.27	-6.85	-70.54	.00
TOT	314.	GAIN	124.	0.	3. -53.	0.	38.	2.	19.	129.
	-326.			-6.	-53.	0.	-84.	-42.	-422.	0.
MAX	HEATING	LOAD=	-272	2020.	BTUH ON	DEC 18	HOUR 8	AME	BIENT TE	MP 1.
XAM	COOLING	LOAD=	283	3232.	BTUH ON	JUL 23	HOUR 14	AME	SIENT TE	MP 68.

ZONE UA BTU/HR-F 1404.6

BEACON Energy Analysis By EMC Engineers, Inc. 625R-4.I

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

									FAN TO	TAL
INTERNA	AL				~	OTN	LIGHTING	DDOCESS	HEAT	HEAT GAIN
			SPACE URE F			OIN-	THOUSAND			
MONTH								BTU	BTU	BTU
JAN	70.	76.		4		62.	3.32	12.81	4.22	24.09
			69.	27	ь	4.				
FEB	70.	76.		13			2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	78.		12	15	72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
				30	16	84.	3.14	12.09	4.08	22.85
APR	73.	78.	69.			30.	3.14	12.05	1.00	
MAY	7 5.	78.		15		80.	3.32	12.81	4.22	24.09
			70.	11	6	39.				
JUN	76.	78.		27	15	89.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	77.	78		13	15	91.	3.26	12.57	4.22	23.72
OOL	,,.	70	73.				2.2.			
							2.20	10.01	4.22	24.09
AUG	7 7.	78	71.	30 25		87. 55.	3.32	12.81	4.22	24.09
			/1.	23	,	55.				
SEP	75.	78		11		85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78		5	15	73.	3.32	12.81	4.22	24.09
			69.	28	6	33.				
*****		77		0	16	75.	3.20	12.33	4.08	23.22
NOV	71.	77	69.				5.20	12.00	• • • • • • • • • • • • • • • • • • • •	
					,					
DEC	70.	74					3.20	12.33	4.22	23.35
			67.	. 18	6	U.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	655	2	1	0	2720E+06	.0000
FEB	535	0	0	0	2328E+06	.0000
MAR	477	29	0	0	2352E+06	.1053E+06
APR	239	149	0	0	1465E+06	.1556E+06
MAY	38	317	0	0	9832E+05	.1914E+06
JUN	0	483	0	0	.0000	.2522E+06
JUL	0	607	0	0	.0000	.2832E+06
AUG	0	589	0	0	.0000	.2581E+06
SEP	65	367	0	0	9601E+05	.2404E+06
OCT	236	130	0	0	1368E+06	.1826E+06
NOV	435	39	0	0	1979E+06	.1295E+06
DEC	684	0	10	0	2720E+06	.0000
YEAR	3364	2712	11	0	2720E+06	.2832E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	107.33	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.80	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.94	.08	3.26	12.57	1.24	23.72	20.8
APR	27.42	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.62	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.50	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.32	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.91	3.32	12.81	1.24	24.09	31.2
SEP	5.79	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.50	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.85	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.70	.00	3.20	12.33	1.24	23.35	12.6
YEAR	480.95	23.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153847. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 6 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	A	AVG. MBT. DEG. F	MAX SYSTEMP. DEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2328E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.1053E+06	2352E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1556E+06	1465E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	9832E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2522E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2404E+06	9601E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1826E+06	1368E+06
NON	1039.	732.	1.000	47.	0.	0.	0	0	.1295E+06	1979E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2720E+06

105.0 10.0 10.5 .0

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF ----- PROGRAM CONTROL OPTIONS -----COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) 1 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA ------*****REAL WEATHER FROM DISK****** FILE NAME SPRNGFMO STATION 13995 YEAR 1955 SITE LATITUDE DEG (AL1) 37.750000 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
TNITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000 FLOOR AREA (SQFT) 5795.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000 INFILTRATION PROFILE .850 .850 1.00 1.00 1.00 1.00 .850 A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 49.200000 WINDOW GLASS NUMBER (NG) 30 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01 WINDOW SHADING FACTOR (SHD) 6.200000E-01 WALL DATA 1 WALL NUMBER
AZIMUTH ANGLE (AZ)
.00
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
WINDOW HEIGHT FT (WNDH)
WINDOW WIDTH FT (WNDW)
WINDOW WIDTH FT (WNDW)
WIDTH OF OVERHANG (WOH)
OVERHANG HGT ABV WNDW (HOH)

A 00

90.00
180.00
180.00
10.00
10.00
10.00
10.00
10.00
10.00
10.00
10.00
10.00 WALL NUMBER .00 90.00 180.00 -90.00 482.0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120 0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.244	244
WALL TRANSFER FUNCTIONS				.211
CN FACTORS	.01837	.01822	.01829	01829
CN FACTORS NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)		•	,	3
N=1	.00003	.00003	.00003	00003
N=2	.00283	.00280	.00281	.00281
N=3	.01017	01008	.01012	.01012
N=4			.00496	
N=5	.00037	.00036	00036	.00436
N=6	*****	******	.00036 *****	.00036
NUMBER OF DN FACTORS (ND)	5	5	E	
DN FACTORS	_	J	3	5
N=1	1.00000	1 00000	1.00000	1 00000
N=1 N=2 N=3 N=4	-1.50943	-1 50943	-1 50000	1.00000
N=3	.65654	65654	-1.50543	-1.50943
N=4	07415	- 07415	07415	.05054
NT F	,	.07415	0/415	0/415
N=6	******	******	.00212 *****	.00212
ROOF AREA SQFT (AROF) 5795	000000			*****
ROOF U VALUE BTU/HR-SQFT-F (URI	7) 2.65	00005-02		
ROOF TRANS FUNCTIONS USED (1=YI	ES 0-NO)	(TPOOF)	-	
ROOF C TRANSFER FUNCTION (CNR)	1 4094	36E-04	1	
ROOF B TRANSFER FUNCTIONS (BNR)	1.1001	2011-04		
.000 .130E-05 .195E-04	.643E-04	481E-04	9095-05	
ROOF D TRANSFER FUNCTIONS (DNR)	.0152 01	.4014-04	.9096-05	
1.00 -1.97 1.36 -	.410	.534E-01	- 250F-02	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKC	0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	7			
SKYLIGHT SHADING COEFFICIENT (S	HSK) 0	.00000E+0	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST	, NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	SK (MND, NI	OND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	00		_
DATTINE SKI DIGHT O BIO/SOFT-HR				
NIGHT TIME SKYLIGHT II PTII/COPT	- F (SKYII)	1 .	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	-F (SKYU) HR-F (SKYT	лу)	7 292998	
FRACTION OF PROCESS HEAT TO INT	-F (SKYU) HR-F (SKYT	лу)	7 292998	I-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW	·	- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		00021110
HOUR	H	OURLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

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.900 1.000 1.000
.900 1.000 1.000
          1.000
                                                     70.0
                                                                 76.0
  9
                                                      70.0
                                                                  76.0
  10
          1.000
                              1.000
                               .800
                                         .800
                                                      70.0
            .800
                       .800
                                                                  76.0
  11
            .500
                               .400
                                         .400
                      .500
                                                      70.0
                                                                  76.0
  12
                     .500 .400 .400

.800 .800 .800

.900 1.000 1.000

.900 1.000 1.000

.900 1.000 1.000
            .800
                                                      70.0
                                                                  76.0
  13
  14
           1.000
                                                      70.0
                                                                  76.0
          1.000
                                                      70.0
  15
                                                                  76.0
                                                     70.0
  16
          1.000
                                                                  76.0
                                        1.000
  17
          1.000
                     .800 1.000
                                                     70.0
                                                                  76.0
                               .100
  18
           .200
                     .200
                                         .100
                                                     70.0
                                                                  76.0
                               .000
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                                                     70.0
                                                                 76.0
  19
            .100
                              .000
                      .000
  20
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            .100
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  21
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                                                                76.0
            .100
  22
                      .000
                                          .000
            .100 .000 .000 .000 70.0
.100 .000 .000 .000 70.0
                                                                76.0
  23
                                                                76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
                                 0.000000E+00
SYSTEM SUPPLY AIR START TIME HR
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000 HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                           .400
                                                                    .451
.100 .191 .200 .286 .300 .369
.500
           .537
                   .600
                              .625
                                                           .800
                                        .700
                                                  .718
                                                                     .812
.900 .906 1.00 1.00 CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000 COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000 .000 .000 .000 .000
                                                           .000 .000
          .000
                                                            .000
                                                 .000
 .000
                   .000
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                   .000 .000
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BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITN DOOR AND				VENT AND	
MNTI	H LOAD			ROOF	SLAB	RSMT	WAT.T.	WINDOW		LATENT
	.00	GAIN	7.38		.00	.00	.00	00	00	.00
		LOSS			-8.90					
	,								,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.67				-7.55		-12.89			.00
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-44.96			58	-7.02	.00	-10.33	-5.59	-56.73	.00
APR	10.40	GAIN	11.93	.00	.04	.00	2.43	.03	.27	1.64
	-16.72	LOSS		33	-4.19	.00	-5.09	-3.34	-32.13	.00
MAY	25.21	GAIN	13.07	.02	.14	.00	4.54	.11	.87	6.48
	-1.90	LOSS		17	-2.52	.00	-2.16	-1.94	-19.18	.00
JUN			13.17				6.92			
	.00	LOSS		06	-1.19	.00	62	91	-8.72	.00
777 77	04 40	CATN	12 20		1 00	0.0	0.05			
ООП	84.42 .00		13.38		1.02 73	.00			6.90	
	.00	LOSS		03	/3	.00	29	5/	-5.45	.00
AUG	78.84	GAIN	11.73	0.9	77	.00	7 76	60	4.98	35.90
1100	.00		***,75		81		36			
		2000		.01	.01	.00	.50	.02	3.27	.00
SEP	43.53	GAIN	10.12	.03	.39	.00	4.51	.32	2.74	19.82
		LOSS			-1.97		-1.94			
OCT	8.75	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-13.97	LOSS		36	-4.01	.00	-5.63	-3.12	-29.34	.00
	1.49		6.92		.00		.31			
	-35.23	LOSS		53	-5.76	.00	-9.97	-4.49	-43.88	.00
חבת	0.0	CATN	C 45	0.0	0.0		0.7	0.0	• • •	
	.00 -74.37		6.45		.00 -8.71		.01			
	- /4.3/	LOSS		/9	-0./1	.00	-17.28	-6.85	- /0.55	.00
тот	314.	GATN	124	Λ	3.	0	38.	2	10	129.
101	-325.		141.	-5	-53.					0.
	223.	2000		٠,	33.	٠.	-01.	-72.	-422.	υ.
MAX	HEATING	LOAD=	-2720	020. B	TUH ON DE	C 18	HOUR 8	AMB	IENT TEM	IP 1.
MAX	COOLING	LOAD=	2833	348. B	TUH ON JU	JL 23	HOUR 14	AMB	IENT TEM	IP 68.
										

ZONE UA BTU/HR-F 1341.4

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

									FAN TO	TAL
INTERNA							T TOURTNO	PROGRAGA	TIO NO	HEAT GAIN
			SPACE			OIN-				
MONTH			URE F MIN			IDENT MBT.		BTU		BTU
							2 20	10 01	4 22	24.09
JAN	70.	76.		4		62. 4.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	70.	76.		13	17	64.	2.95	11.38	3.81	21.47
			69.	2		14.				
										00 50
MAR	71.	78.		12		72.	3.26	12.57	4.22	23.72
			69.	4	6	15.				
APR	73	78.		30	16	84.	3.14	12.09	4.08	22.85
AFR	73.	70.	69.				0.1.			
				_						
MAY	75.	78.		15	15	80.	3.32	12.81	4.22	24.09
			70.	11	6	39.				
TD		70		27	15	89.	3.14	12.09	4.08	22.85
JUN	/6.	78.	71.				3.14	12.05	1.00	
			,	- '	J					
JUL	77.	78.		13	15	91.	3.26	12.57	4.22	23.72
			73.	10	6	60.				
		=0		30	1.4	87.	3.32	12 21	4.22	24.09
AUG	77.	78.	71.				3.32	12.01	4.22	21.05
			,,,	2.7	,	55.				
SEP	75.	78.		11	14	85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
				_		5 0	2 22	10 01	4.22	24.09
OCT	73.	78.	69.	5 28		73. 33.	3.32	12.81	4.22	24.09
			69.	20	6	33.				
NOV	71.	77.		8	16	75.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
									4 00	22.25
DEC	70.	74.					3.20	12.33	4.22	23.35
			67.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF B	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	655	2	1	0	2720E+06	.0000
FEB	534	0	0	0	2322E+06	.0000
MAR	476	29	0	0	2347E+06	.1056E+06
APR	238	150	0	0	1461E+06	.1557E+06
MAY	37	318	0	0	9805E+05	.1914E+06
JUN	0	482	0	0	.0000	.2521E+06
JUL	0	606	0	0	.0000	.2833E+06
AUG	0	588	0	0	.0000	.2581E+06
SEP	65	368	0	0	9577E+05	.2404E+06
OCT	234	130	0	0	1365E+06	.1827E+06
NOV	435	39	0	0	1974E+06	.1297E+06
DEC	684	0	10	0	2720E+06	.0000
YEAR	3358	2712	11	0	2720E+06	.2833E+06

SYSTEM TOTALS

			Y CONSUMPT		_	OTAL INTERNAL	
	HEATING MILLION	COOLING THOUSAND	LIGHTING THOUSAND	PROCESS MILLION	FANS THOUSAND	HEAT GAIN MILLION	ELECTRIC DEMAND
MONTH		KWH	KWH	BTU	KWH	BTU	KW
JAN	107.00	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.49	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.68	.08	3.26	12.57	1.24	23.72	20.8
APR	27.29	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.54	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.49	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.31	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.90	3.32	12.81	1.24	24.09	31.2
SEP	5.78	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.29	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.68	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.38	.00	3.20	12.33	1.24	23.35	12.6
YEAR	479.13	23.71	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153526. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc.

625R-5.I

BLDG 625 - BATTALION HQ INSTALL 9 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					MOUD	S WHEN	W3 1771 ern e	
	SURF.	SURF.		AVG.	MAX SYS	TEM			MAXIMUM	
	BTU/	BTU/	;	AMBT.	TEMP. D			M LOADS	COOLING	
	SQFT-	SOFT-	PF	DEG.	DEG.			MET	LOAD	LOAD
MONTH	_	DAY	FACTOR	F			COOL	HEAT	BTU	BTU
		2711	PACION	F	+	-				
JAN	1041.	675.	1.000	35.	0.	ο.	0	•		
			2.000	55.	0.	0.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	ο.	0	•	0000	
			2.000	57.	٠.	0.	U	0	.0000	2322E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	10565 06	
					٠.	٥.	U	U	.1056E+06	2347E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	15575.06	1461E+06
					• •	٠.	Ū	U	.133/6+06	1461E+U6
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	1914F±06	9805E+05
							•	ŭ	.101411400	9605E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2521E+06	.0000
										.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2404E+06	9577E+05
0.00										
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1827E+06	1365E+06
NOV	1020	720								
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1297E+06	1974E+06
DEC	883.	604.	1 000	a =		_				
שמע	003.	604.	1.000	35.	0.	0.	0	0	.0000	2720E+06

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BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
 FILE NAME SPRNGFMO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1) 37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                        1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                          56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
 FLOOR AREA (SQFT) 5795.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
 INFILTRATION PROFILE

    .850
    .850
    .850
    .850
    .850
    .850
    1.00

    1.00
    1.00
    1.00
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    1.00
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    .850
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                                                                            .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
 PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                         WALL DATA
WALL DATA
WALL NUMBER

1 2 3 4
AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00
WALL AREA SQFT (AWLL) 1000.0 849.0 1039.0 482.0
WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 105.0
WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0
WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 10.5
WIDTH OF OVERHANG (WOH) .0 .0 .0 .0
OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0
                                                                               -90.00
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MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.245	.243	.244	.244
CN FACTORS	01027	01.022	01920	01020
NUMBER OF BN FACTORS (NB	.01037	.01622	5	.01029
BN FACTORS BN (BN)	5	3	5	5
N=1	00003	00003	00003	00003
N=2	.00283	.00280	00281	00281
N=3	.01017	.01008	01012	01012
N=4	.00498	.00494	.00496	.00496
N=5	.00037	.00036	.00036	.00036
N=1 N=2 N=3 N=4 N=5 N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 5795	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=6	*****	******	*****	******
ROOF AREA SQFT (AROF) 5795	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 2.19	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.1647	79E-04		
ROOF B TRANSFER FUNCTIONS (BNR	.)			
.000 .107E-05 .161E-04		.397E-04	.751E-05	
ROOF D TRANSFER FUNCTIONS (DNR 1.00 -1.97 1.36	.)			
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	3000	
SKYLIGHT HEIGHT FT (SKH) 0. SKYLIGHT WIDTH FT (SKW) 0.0	000000000000000000000000000000000000000			
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	004400000)	
SKYLIGHT GLASS NUMBER (NS)		0.0000	005400	
SKYLIGHT SHADING COEFFICIENT (SHSK) 0	.000000E+0	10	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR S	HSK (MND, N	DND)	1	1
SKY LIGHT AREA SOFT (ASKY)	0.000000E+	0.0		_
DAYTIME SKY LIGHT U BTU/SOFT-H	R-F (SKYU)	1.	.292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.100000	E-01

------THTERNAL GAINS AND PROFILES -----THERMOSTAT SET

POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRAC	CTION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

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70.0
70.0
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 9
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 23
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                                    .000
                                                70.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000 NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
                             24.000000
SYSTEM SUPPLY AIR STOP TIME HR
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN)
                    5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                    .400
                                                            .451
        .191
                          .286 .300 .369
                  .200
 .100
                                                    .800
                                                              .812
                                           .718
                                   .700
         .537
                  .600
                           .625
 .500
         .906
                           1.00
                 1.00
 .900
CHILLER TYPE (ITYPCH)
                           4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                              .000
                                                     .000
 .000 .000 .000 .000 .000
                                                     .000
                  .000
                                           .000
                                                              .000
                          .000
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                  .000
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BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITN DOOR AND	Ī			VENT AND	
MNTH	LOAD			ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-76.00	LOSS		66	-8.90	.00	-17.22	-7.08	-73.64	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.57	LOSS		55	-7.55	.00	-12.89	-6.03	-62.36	.00
MAR	.95	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-44.87	LOSS		48	-7.02	.00	-10.33	-5.59	-56.74	.00
APR	10.41	GAIN	11.93	.00	.04	.00	2.43	.03	.27	1.64
	-16.68	LOSS		27	-4.19	.00	-5.09	-3.34	-32.13	.00
YAM	25.22	GAIN	13.07	.02	.14		4.54		.87	
	-1.90	LOSS		14	-2.52	.00	-2.16	-1.94	-19.19	.00
JUN	60.33	GAIN	13.17	.05	.40		6.92		2.62	
	.00	LOSS		05	-1.19	.00	62	91	-8.72	.00
JUL		GAIN	13.38				9.25			
	.00	LOSS		03	73	.00	29	57	-5.45	.00
		~						60	4 00	35.90
AUG			11.73				7.76 36		4.98	
	.00	LOSS		03	81	.00	36	~.6∠	-5.27	.00
CED	43.54	CAIN	10.12	.03	.39	0.0	4.51	32	2 74	19.82
SEF		LOSS	10.12	12	-1.97		-1.94			
	2.52	HODE			1.57		2.72	1.55		
ОСТ	8.76	GAIN	8.62	.00	.06	.00	1.34	.05	.39	2.68
	-13.94				-4.01		-5.63			
NOV	1.49	GAIN	6.92	.00	.00	.00	.31	.00	.00	.40
		LOSS		44	-5.76		-9.97			
				,						
DEC	.00	GAIN	6.45	.00	.00	.00	.01	.00	.00	.00
	-74.23	LOSS		66	-8.71	.00	-17.28	-6.85	-70.55	.00
TOT	314.	GAIN	124.	0.	3.	0.	38.	2.	19.	129.
	-324.	LOSS		-4.	-53.	0.	-84.	-42.	-422.	0.
MAX	HEATING	LOAD=	-272	020. B	TUH ON I	DEC 18	HOUR 8	AME		
XAM	COOLING	LOAD=	283	394. B	TUH ON J	TUL 23	HOUR 14	AME	BIENT TE	MP 68.

ZONE UA BTU/HR-F 1314.7

BEACON Energy Analysis By EMC Engineers, Inc. 625R-6.I

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

T.1000011									FAN TO	LATC
MONTH	INTE	PERAT	SPACE URE F		(COIN- CIDENT		PROCESS MILLION BTU	MILLION	HEAT GAIN MILLION BTU
JAN		76.		4	17	62. 4.	3.32		4.22	24.09
FEB	70.	76.	69.			64. 14.	2.95	11.38	3.81	21.47
MAR	71.	78.		12 4	15 6		3.26	12.57	4.22	23.72
APR	73.	78.		30 9		84. 30.	3.14	12.09	4.08	22.85
MAY	7 5.	78.	70.	15 11			3.32	12.81	4.22	24.09
JUN	76.	78.	71.		15 6		3.14	12.09	4.08	22.85
JUL	77.	78.	73.	13 10			3.26	12.57	4.22	23.72
AUG	77.	78.	71.		14 7	87. 55.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.	11 15		39.			4.08	
OCT		78.	69.		6	33.	3.32		4.22	
NOV		77.	69.			18.			4.08	
DEC	70.	74.	67.		17 6		3.20		4.22	
YEAR							38.54	148.46	49.64	280.00

625R-6.I

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

•		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	655	2	1	0	2720E+06	.0000
FEB	534	0	0	0	2320E+06	.0000
MAR	475	30	0	0	2345E+06	.1051E+06
APR	238	150	0	0	1459E+06	.1558E+06
MAY	37	317	0	0	9794E+05	.1914E+06
JUN	0	482	0	0	.0000	.2521E+06
JUL	0	605	0	0	.0000	.2834E+06
AUG	0	588	0	0	.0000	.2581E+06
SEP	65	369	0	0	9566E+05	.2404E+06
OCT	234	130	0	0	1364E+06	.1827E+06
NOV	435	39	0	0	1972E+06	.1298E+06
DEC	684	0	10	0	2720E+06	.0000
YEAR	3357	2712	11	0	2720E+06	.2834E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	106.87	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.38	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.55	.08	3.26	12.57	1.24	23.72	20.8
APR	27.26	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.54	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.49	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.30	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.90	3.32	12.81	1.24	24.09	31.2
SEP	5.77	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.26	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.61	.13	3.20	12.33	1.20	23.22	22.2
DEC	106.25	.00	3.20	12.33	1.24	23.35	12.6
YEAR	478.47	23.71	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153410. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ INSTALL 12 IN. FB BATT INSUL. ON ROOF

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.								
;	HORIZ.							S WHEN	MAXIMUM	MAXIMUM
	SURF. BTU/	SURF. BTU/	7	AVG. MBT.	MAX SYS'			M LOADS	COOLING LOAD	HEATING LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.		COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2320E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1051E+06	2345E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1558E+06	1459E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	9794E+05
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.2521E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2834E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	. 0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2404E+06	9566E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1827E+06	1364E+06
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.1298E+06	1972E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	2720E+06

APPENDIX D

ECO ANALYSIS BACKUP DATA AND FIELD SURVEY FORMS

GENERAL

The first section of Appendix D contains general backup data that was used in the ECO analysis calculations for all the buildings evaluated. The general backup data includes:

- Material and labor cost data tables
- Manufacturers literature and cost data.

ECO ANALYSIS BACKUP DATA

The subsequent sections of Appendix D contain the ECO analysis backup data for each of the ten representative buildings evaluated. Each representative building tab includes the following data in the order listed:

- Annual Energy Savings Summary (energy savings are extrapolated to similar buildings)
- Investment Cost Summary (investment costs are extrapolated to similar buildings)
- Life Cycle Cost Analyses (LCCAs)
- Engineer's Opinion of Probable Costs
- BEACON Computer Simulation Data
- Field Survey Forms

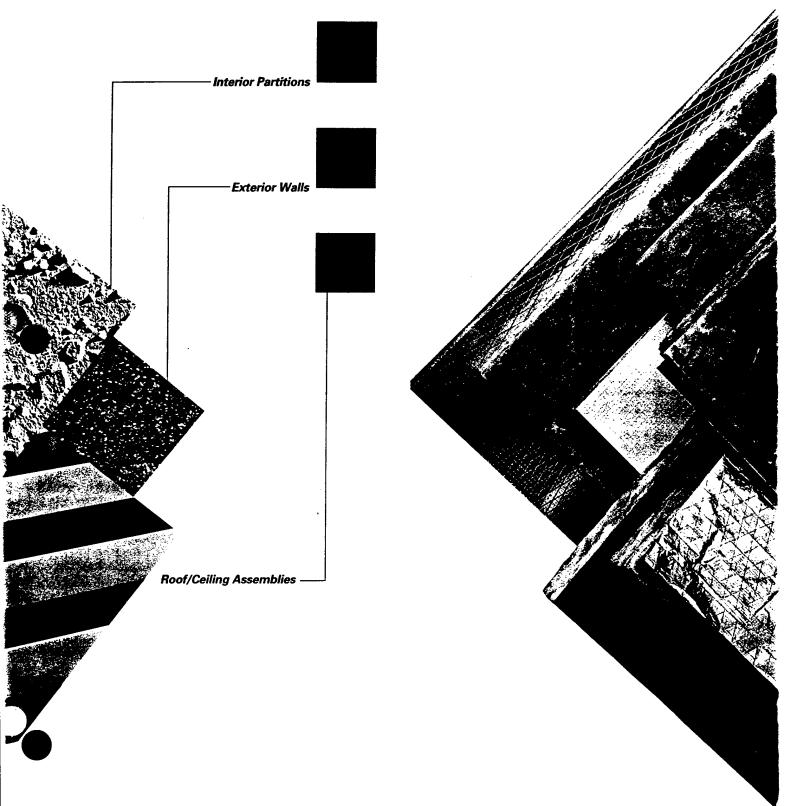
	O IVICITY O	9 I ABOD COST I COK IID TABI E					OATE DOEDABED	0 4 0	40 100 06	
		LABOR COST LOOK OF TABLE					מאוביוער	FARED	10-7all-30	
PROJECT	JECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard, MO					PREPARED BY	D BY	D.S	D.Sinz
ENGI	ENGINEER	E M C Engineers, Inc.				•	CHECKED	ВУ	A. Niemeyer	neyer
		Denver, CO								
				Material	Location					"95 Means
Line	Item Refer	Item Description	Unit of Measure	Average Cost	Adj. Cost 0.954	Labor Code	Labor Cost/Hr.	Labor Time (Hrs)	Facilities" Line No.	Facilities" Page No.
-	CONT	CONTINGENCY			20%		:			
2	DIFF	DIFFICULTLY FACTOR			2%					
3	11-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	\$0.62	\$0.59	1-CARP	\$26.3	0.008	029	211
4	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	\$0.19	\$0.18	1-CARP	\$26.3	0.007	100	211
2	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	\$1.92	\$1.83	2-TILE	\$48.4	0.084	5400	294
9	<u></u>	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	\$0.21	\$0.20	2-CARP	\$52.5	0.017	350	272
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	L.F.	\$0.20	\$0.19	1-CARP	\$26.3	0.016	302	190
8	MSI	2"x4" STUDDED WALL 2' OC	L.F.	\$0.25	\$0.24	F-2	\$55.1	0.009	502	190
တ	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	\$0.07	\$0.07	1-PORD	\$24.1	0.010	240	297
9	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDED	S.F.	\$0.84	\$0.84	2-CARP	\$52.5	0.020	Estimate	
7	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDED	S.F.	\$0.96	\$0.96	2-CARP	\$52.5	0.020	Estimate	
12	ЮН	OVERHEAD			17%					
13	PRO	PROFIT			10%					
14	R12WMH		EA.	\$19.28	\$18.39	Q-6	\$87.5	5.25	100	408
15	R15B	RELOCATE 15' HIGH 104' LONG BLEACHERS	EA.	\$0.00	\$0.00	F-5	\$109.4	26.00	3300	330
16	R15WMH	RELOCATE 15' BASEBOARD RADIATION	EA.	\$19.28	\$18.39	Q-6	\$87.5	5.00	100	408
1	I	RELOCATE 24 BASEBOARD RADIATION	EA.	\$19.28	\$18.39	Q-6	\$87.5	5.68	100	408
9	l	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	\$0.00	00.0\$	1-SSWK	\$29.0	2.46	2200	315
19	R2SSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	\$0.00	\$0.00	1-CARP	\$26.3	0.533	2600	316
50		RELOCATE 30'x8'x2' CLOTHING SHELVES	EA.	\$0.00	\$0.00	1-SSWK	\$29.0	2.705	2200	315
21		RELOCATE 3'-0" AFF WOOD PANELING	S.F.	\$0.95	\$0.91	F-2	\$55.1	0.063	2420	197
22		RELOCATE 4'-0" BASEBOARD RADIATION	EA.	\$19.28	\$18.39	9-0	\$87.5	4.48	100	408
23	R6WMH	RELOCATE 6' BASEBOARD RADIATION	Ä	\$19.28	\$18.39	Q-6	\$87.5	4.68	100	408
24	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L. F.	\$1.20	\$1.14	1-CARP	\$26.3	0.134	700	280
25	RBBR	RELOCATE BASKETBALL BACKBOARD & RIM	Ē	\$0.00	\$0.00	L-2	\$46.4	24.00	1250	330
56	RBM	RELOCATE BATHROOM MIRROR	Ē	\$0.00	\$0.00	1-CARP	\$26.3	0.356	9	566
27	RBS	RELOCATE BATHROOM SINK	EA.	\$18.43	\$17.58	<u>م</u>	\$56.3	7.35	1140	406
28	RCD	RELOCATE PART OF CLOSET DOOR FRAME	EA.	\$28.67	\$27.35	1-CARP	\$26.3	0.44	440	237
29	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	\$0.00	\$0.00	L-2	\$46.4	0.744	400	339
30	RDV	RELOCATE DRYER VENT	EA.	\$12	\$11.45	1-CARP	\$26.3	1.30	7450	327
31	REC	\neg	L.F.	\$1.22	\$1.16	1-ELEC	\$30.4	0.089	2530	638
32	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	EA.	\$0	\$0.00	1-ELEC	\$30.4	5.20	100	717
33	REES		EA.	\$0.00	\$0.00	1-ELEC	\$30.4	1.50	8	765
34	REJB	RELOCATE ELECTRICAL JUNCTION BOX	EA	\$8.20	\$7.82	1-ELEC	\$30.4	1.30	160	691

<u>Σ</u>	I EKIAL &	MATERIAL & LABOR COST LOOK UP TABLE					DATE PREPABEN	DABEN	40 lan 06	
PRO	PROJECT	Limited Energy Study, Insulate Brick Buildings, Fort Leonard, MO	Q				PREPARED BY	D RV	De-libon	Sinz Clark
ENG	ENGINEER	neers, Inc.					CHECKED BY] B√	A N	A Niemever
		Denver, CO								200
:				Material	Location				"95 Means	"95 Means
S E	Item Keter	Item Description	Unit of	Average	Adj. Cost	Labor	Labor	Labor	Facilities"	Facilities"
35	REI	RELOCATE EMERGENCY LIGHT	Measure	Sost G	0.954	Code	Cost/Hr.	Time (Hrs)	Line No.	Page No.
9,5	RFIS	RELOCATE ELECTRICAL LIGHT CANTOL	5 6	9	\$0.00	1-ELEC	\$30.4	3.25	200	765
3 6	REO		ž į	\$9.25	\$8.82	1-ELEC	\$30.4	0.844	900	691
\$ 8	RED	RELOCATE ELECTRICAL DOLLE!	EA.	\$8.35	\$7.97	1-ELEC	\$30.4	0.896	700	691
3 8	DEC	DEI OCATE ELECTRICAL PANEL	E I	20	\$0.00	1-ELEC	\$30.4	12.191	150	723
3 5	DEADD	DELOCATE FIDE ALABABINI BOX	EA.	\$0	\$0.00	R-3	\$103.6	24.00	7300	331
} {	אראים	RELOCATE FIRE ALARIM PULL BOX	EA.	\$0.00	\$0.00	1-ELEC	\$30.4	1.60	7000	782
± £	ביר היי	RELOCATE FAN COIL UNI	ĒĀ	\$21.28	\$20.30	0 - 6	\$87.5	29.5	100	408
3 4	AFE		EA.	\$0.00	\$0.00	1-CARP	\$26.3	0.20	2000	513
£ ;	KFSAG	RELOCATE FLOOR SUPPLY AIR GRILLES	EA.	\$4.00	\$3.82	1-SHEE	\$30.0	1.69	1120	601
4	RFSS 200	RELOCATE FIRE SUPPRESSION SYSTEM	EA.	\$0.00	\$0.00	Q-2	\$87.6	16.00	Estimate	
و (KGL	REMOVE GYM LOCKER	EA.	\$0.00	\$0.00	1-CARP	\$26.3	06.0	Estimate	
<u>و</u> ا	KKB	RELOCATE KEY BOX	EA.	\$0.00	\$0.00	1-CARP	\$26.3	0.65	10	336
4 6	RLKS	RELOCATE LARGE KITCHEN SINK	EA.	\$74.50	\$71.07	<u>م</u> ۔	\$56.3	16.751	1050	499
\$ S	KMWKC	RELOCATE MAPLE WALL IN RACQUETBALL CRT.	EA.	\$8,775	\$8,371.35	3-CARP	\$78.8	88.00	006	368
£ 5	RPDMS	RELUCATE PULL DOWN MOVIE SCREEN	S.F.	\$0.00	\$0.00	2-CARP	\$52.5	1.50	300	323
8 2	RKG Do	RELUCATE RETURN AIR GRILLE	EA.	\$0.00	\$0.00	1-SHEE	\$30.0	4.00	Estimate	
<u> </u>	S 2	RELUCATE SPEAKER	EA.	\$0.00	\$0.00	1-ELEC	\$30.4	1.50	400	787
7 5	KSD SSS	RELOCALE SOAP DISPENSER	EA.	\$0.00	\$0.00	1-CARP	\$26.3	0.70	2000	316
3 3	KSS.	KELUCA I E SLOP SINK	EA.	\$40.18	\$38.33	Q-1	\$56.3	5.67	100	498
¥ [Z (RELOCATE THERMOSTAT	EA.	\$0.00	\$0.00	1-ELEC	\$30.4	1.70	5030	596
ဂ္ဂ	אול א	RELUCALE 8 I ELEPHONE BOOTHS	EA.	\$0.00	\$0.00	3-CARP	\$78.8	48.00	Estimate	
8 5	S L	RELOCATE TELEPHONE JACK	EA	\$21.00	\$20.03	1-ELEC	\$30.4	0.33	2510	681
2	0 -	RELOCATE TOILET STALL	Æ	\$0.00	\$0.00	2-CARP	\$52.5	3.54	1700	302
S	מאלים	RELOCATE URINAL	E	\$81.50	\$77.75	Ω-1	\$56.3	13.49	3000	501
ရှိ ရ	Z K	RELOCATE WALL CABINET	EA.	\$0.00	\$0.00	1-CARP	\$26.3	1.70	4700	201
3 8	TWHO	RELOCATE WALL HAND DRYER	EA.	\$0.00	\$0.00	1-CARP	\$26.3	3.20	2300	316
ة ة	KWMIS	RELOCALE WALL MOUNTED TELEVISION SET	EA.	\$30.10	\$28.72	L-2	\$46.4	3.42	Estimate	
7 5	לאיל פיני	RELUCATE 1/2" HW & CW DOMESTIC PIPING	EA.	\$26.26	\$25.05	Q-1	\$56.3	4.55	1140	406
3 2	KWPL	RELOCATE WALL PLACARD	EA.	\$0.00	\$0.00	1-CARP	\$26.3	0.65	Estimate	
2 4	RWS	RELOCATE WOOD SHELF	L.	\$1.28	\$1.22	1-CARP	\$26.3	0.12	10	196
3	י אאר	RELOCATE WATER CLOSET	EA.	\$37.56	\$35.83	Q-2	\$87.6	10.90	3300	505

I ABOR	COSTIC	OOK UP TABLE	SHEET	1	OF	1
PROJECT		eonard Wood Wall Insulation Feasibility Study	DATE PREPARED 18-Feb-96			
ENGINEER		Engineers, Inc.	PREPARE		D. Sinz	
ENGINEER		er, CO	CHECKE		A. Niemeye	•
	DCITY	51, 00		Average	Location	
Line	Item Refer	Item Description		Cost	Adj. Cost	"95 Means"
Line No.	Code	Rem Besonption		\$/hr	1.068	Page No.
		CARPENTER		\$24.60	\$26.27	Back Cover
1 2	1-ELEC	ELECTRICIAN		\$28.50	\$30.44	Back Cover
3	1-PORD	ONE PAINTER		\$22.60	\$24.14	Back Cover
4	1-SHEE	SHEET METAL WORKER		\$28.10	\$30.01	Back Cover
5		STRUCTURAL STEEL WORKERS		\$27.15	\$29.00	962
	2-CARP	TWO CARPENTERS		\$49.20	\$52.55	962
7	2-TILE	TWO CERAMIC TILE WORKERS		\$45.35	\$48.43	Back Cover
8	3-CARP	THREE CARPENTERS		\$73.80	\$78.82	962
9	F-2	TWO CARPENTERS, TWO POWER TOOL	S	\$51.60	\$55.11	961
10	F-5	1 FOREMAN, 3 CARP, 2 PWR TOOLS		\$102.40	\$109.36	961
11	L-2	CARPENTER & HELPER		\$43.45	\$46.40	962
12	Q-1	PLUMPER & APPRENTICE		\$52.75	\$56.34	962
13	Q-2	TWO PLUMBERS & ONE PLUMBER APPR	ENTICE	\$82.05	\$87.63	962
14	Q-6	STEAM FITTER CREW		\$81.90	\$87.47	963
15	Q-9	SHEET METAL CREW		\$50.60	\$54.04	963
16	R-3	1 FOREMAN, 1 ELEC., .5 EQ. OPER., .5 S.	P. CRAN	\$97.04	\$103.64	963
17					ļ	
18						
19						
20						
21						
22						
23						
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39	 			†		
40	 					
	 					
41					<u> </u>	<u> </u>



Commercial Building Insulation



Thermal Batt Insulation

- Provides excellent acoustical control, ratings to STC 64
- Useful in a wide range of interior partition applications
- Easy to install and fabricate
- Dimensional stability assures in-place performance

Technical Data	Technical Data									
	Thickness	Width	Length	R-value*						
Metal Frame Construction	3½° 89mm	16' 406mm 24' 609mm	96" 2438mm	11.0						
	3½° 89mm	16' 406mm 24' 609mm	96" 2438mm	13.0						
	6¼° 159mm	16' 406mm 24' 609mm	96" 2438mm	19.0						
Wood Frame Construction	3½" 89mm	15' 381mm 23' 584mm	93' 2362mm	11.0						
	3½" 89mm	15' 381mm 23' 584mm	93' 2362mm	13.0						
	3½" 89mm	15' 381mm 23' 584mm	93' 2362mm	15.0						
	6¼" 159mm	15' 381mm 23' 584mm	93' 2362mm	19.0						
	5½" 139mm	15' 381mm 23' 584mm	93' 2362mm	21.0						

Unfaced Thermal Batt Insulation complies with the property requirements of ASTM C 665, Type I and ASTM E 136. Kraft-faced Thermal Batt Insulation complies with ASTM C 665, Type II, Class C. Foil-faced Thermal Batt Insulation complies with ASTM C 665, Type III, Class B.

Surface Burning Characteristics*/ Building Code Construction Classifications							
	Flame Spread	Smoke Developed	ICBO	BOCAI	SBCCI		
Unfaced	10	10	All types	All types	All types		
Foil-faced	75	150	III, IŸ, V	All types	All types		
Kraft-faced	N/R	N/R	III, IV, V	3, 4, 5	III, V, VI		

Thermal Batt Insulation complies with ICBO (Uniform Building Code), BOCAI (National Building Code) and SBCCI (Standard Building Code) model code requirements for building construction types listed above.

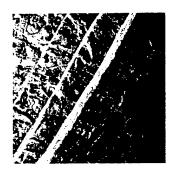
Kraft and standard foil facings on Thermal Batt Insulation will burn and must not be left exposed. Install facings in substantial contact with the finish material. Protect from open flame or other heat source.

Due to the potential for skin irritation, unfaced Thermal Batt Insulation should not be used for exposed application where it will be subject to human contact.

Available Vapor Retarder Facings	Kraft	Foil
Perms Maximum*	1.00	0 .50
Water Absorption		
Maximum by Volume	Less tha	n 0.05%
Dimensional Stability		
Linear Shrinkage	Less tha	ın 0.1%

^{*} Products are tested in accordance with:

R-value Surface Burning Characteristics Perm Rating ASTM C 518 ASTM E 84 ASTM E 96



Exterior Walls

design considerations

General Fire Safety

Kraft and standard foil-faced vapor retarders will burn and must not be left exposed. Install facings in contact with the finish material. Protect facing from open flame or other heat source. Check local codes for application limitations.

Moisture Control

Moisture and its effects are all too often given minimum consideration in the design and construction of buildings. Accumulation of moisture in the building envelope can cause structural damage and reduce thermal performance. • The need for a vapor retarder in commercial construction can be determined by calculating the building's occupancy-moisture rating. Detailed information on calculating the occupancy-moisture rating and on the effects of moisture control in building design and construction can be found in Chapter 20 of the 1989 ASHRAE Handbook of Fundamentals. • In northern heating dominated climates vapor retarders should generally be installed as close to the warm side of the building envelope as possible. In other climates the architect or specifier should evaluate the requirements of each project before making decisions about the use and placement of vapor retarders. • Adequate ventilation of the interior space and of certain sections of the building envelope is also an important consideration. Proper design and installation of a vapor retarder can also help minimize air infiltration and reduce the latent load on the HVAC system. • Maintaining the integrity of the vapor retarder may be important for effective moisture/humidity control. Insulation boards and batts should tightly abut adjacent insulation. Repair any punctures or tears in the facing by taping. Follow the tape manufacturer's application recommendations.

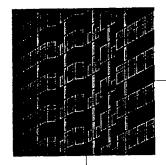
Thermal Expansion and Contraction

When insulation is added to the inside perimeter of a structure, the area outside the insulation becomes exposed to greater temperature extremes. Building structures should be inspected to ensure they can withstand the additional expansion and contraction forces. Check for piping which should be protected against freezing.

Curtainwall Fire Safety

Tests conducted by Owens-Corning at Southwest Research Institute on aluminum curtainwall spandrel panels indicate that curtainwall insulation should be used for thermal control purposes only and is ineffective in preventing the spread of fire from floor-to-floor. Buildings utilizing curtainwall construction should be equipped with a sprinkler system to provide adequate fire protection.

] metal



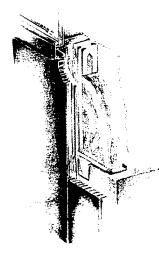
metal panel curtainwall

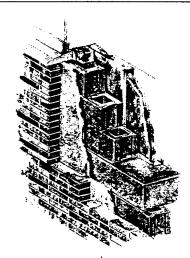
Product Options

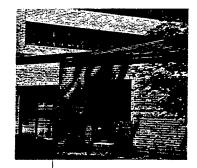
Curtainwall Insulation 700 Series Insulation

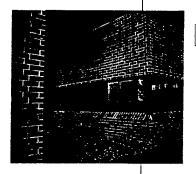
Installation & Design Considerations

- Establish thermal breaks to reduce condensation on cold surfaces.
- Utilize self-weeping curtainwall grid system to vent moisture build-up in the wall cavity.
- The need for and placement of vapor retarders should be determined by the building designer.
- Minimize penetrations of insulation by structural elements, wall attachment devices, etc. In constructions utilizing a vapor retarder, careful consideration should be given to maintaining vapor retarder integrity.
- Buildings utilizing curtainwall construction should be equipped with a sprinkler system to provide adequate fire protection.
- Provide code required fire separation between floors.









\square masonry

masonry wall

Product Options
Thermal Batt Insulation
Flame Spread 25 Insulation
700 Series Insulation

Installation & Design Considerations

- Maintain minimum 1° air space or other capillary break between masonry and insulation. Use weep holes at flashing locations to vent moisture build-up in the wall cavity.
- Insulation between brick and block must be held in contact with the exterior face of the concrete block to maintain air space.
- The need for and placement of vapor barriers should be determined by the building designer.
- Minimize penetrations of insulation by structural elements, wall attachment devices, etc. In constructions utilizing a vapor retarder, careful consideration should be given to maintaining vapor retarder integrity.
- When specifying kraft-faced or standard foilfaced insulation check local code requirements for limitations and install facing in substantial contact with finish surface.



\square metal frame

brick and metal frame wall

Product Options
Thermal Batt Insulation
Flame Spread 25 Insulation

Installation & Design Considerations

- Maintain minimum 1° air space or other capillary break between masonry and insulation. Use weep holes at flashing locations to vent moisture build-up in the wall cavity.
- Maintain air space between sheathing and brick.
- The need for and placement of vapor retarders should be determined by the building designer.
- Minimize penetrations of insulation by structural elements, wall attachment devices, etc. In constructions utilizing a vapor retarder, careful consideration should be given to maintaining vapor retarder integrity.
- When specifying kraft-faced or standard foilfaced insulation check local code requirements for limitations and install facing in substantial contact with finish surface.

^{*} Drawings are not intended to provide complete detail Architect must supply detailed drawings to meet project and building code requirements.



Owens-Corning Sales Offices

AlabamaBirmingham
205-991-9791
Mobile
205-476-5571

Arizona Phoenix 602-996-5540

CaliforniaSacramento
916-721-5525
Redwood City
415-598-9550
Santa Ana
714-433-2440

Colorado Denver 303-292-3255

Connecticut Hartford 203-688-7778

Florida Orlando 407-788-0870 Tampa 813-248-3310

Georgia Atlanta 404-352-6767

*Idaho*Boise
208-362-3771

Illinois Chicago 708-215-5900 Indiana Elkhart 219-294-7228

Kansas Kansas City 913-451-2563

Maryland Hanover 410-712-0050

Massachusetts Boston *617-849-1340*

Michigan Detroit 313-967-1300

Minnesota Minneapolis 612-522-6449

Missouri St. Louis 314-298-9550

New Jersey Hasbrouck Heights 201-288-8233

New York
Rochester
716-924-0530
Syracuse
315-455-5601

North Carolina Raleigh 919-872-0823 **Ohio**Cincinnati
513-281-1173
Cleveland
216-884-9440

OregonPortland
503-223-9618

Pennsylvania Harrisburg 717-652-8503 Philadelphia 215-688-8650

South Carolina Columbia 803-781-4390

TennesseeKnoxville
615-531-0243
Memphis
901-369-9495

TexasDallas
214-448-8670
Houston
713-872-0671

UtahSalt Lake City
801-943-4089

Virginia Richmond 804-379-9127

Washington Seattle 206-562-4700

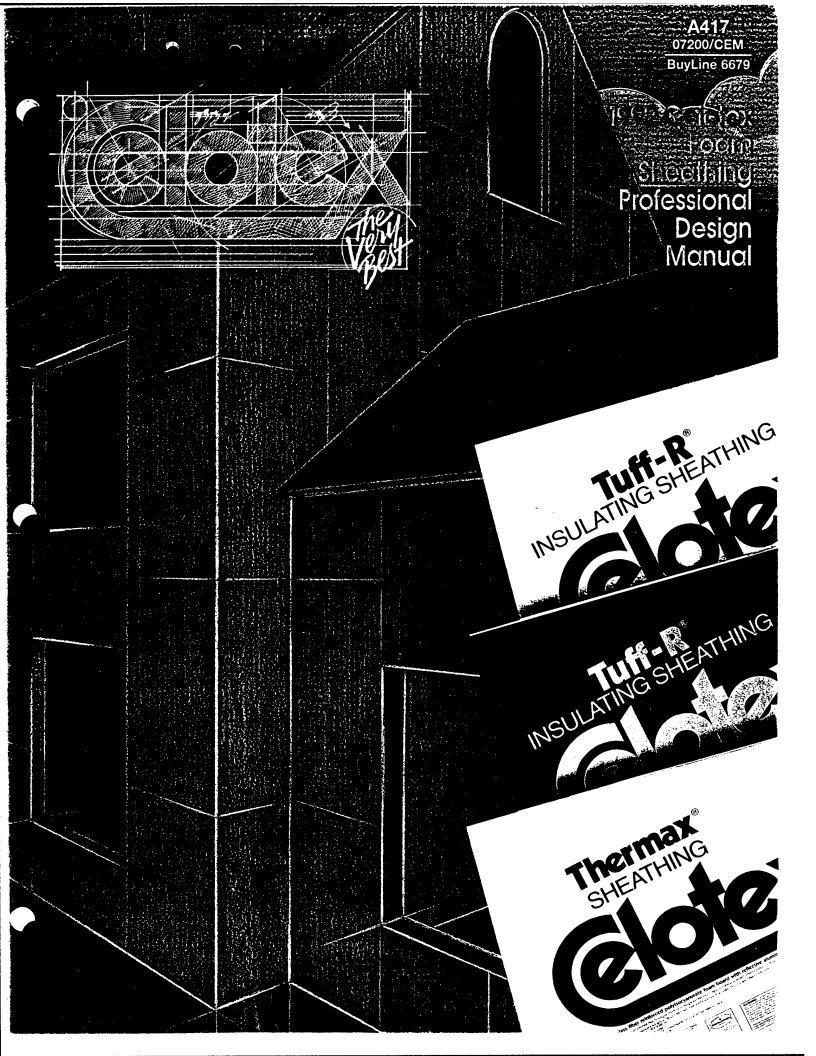
Wisconsin Milwaukee 414-259-0700

Owens-Corning World Headquarters Toledo 419-248-8000



OWENS-CORNING WORLD HEADQUARTERSFIBERGLAS TOWER
TOLEDO, OHIO 43659

RESIDENTIAL AND COMMERCIAL INSULATION



Masonry Wall Systems

Masonry Wall Systems

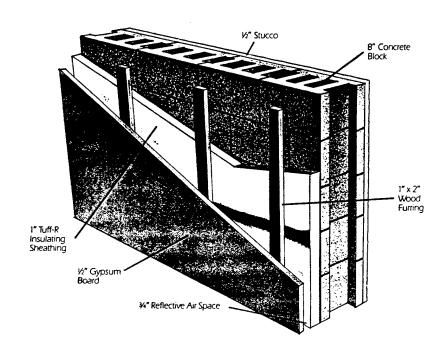
Celotex® Foam Sheathing is an ideal insulation for masonry or concrete wall construction because the material's thin profile makes the application of high efficiency insulation not only easy but also economical.

In some of these systems, sheathing is applied on the interior side of masonry or concrete wall construction. Thermax® Sheathing can be left exposed in unoccupied basement areas and covered later with code approved interior finish. Tuff-R® Insulating Sheathing products must not be left exposed and must be covered with minimum ½" gypsum board.

In this system, the Celotex foil-faced foam sheathings with taped joints and sealed penetrations serve as an effective vapor retarder. A variation of this system would be to install the furring strips against the concrete block with the foam sheathing over the furring.

System R-value

The design R-value for such a wall system would be calculated as follows assuming a 15% framing factor for 1" x 2" wood furring 24" o.c.



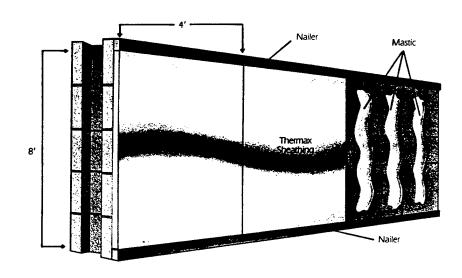
	R-values Through Furring	R-values Between Furring
Inside surface film	0.68	0.68
½" Gypsum board	0.45	0.45
1" x 2" Wood furring	0.94	
¾" Reflective air space		2.77
1" Insulating Sheathing	7.7	7.7
8" Concrete block	1.11	1.11
½" Stucco	0.10	0.10
Outside surface film	0.17	0.17
R-value at sections Total design U-value = $\frac{.15}{}$ + $\frac{.85}{}$ = .079 Total design R-value = $\frac{1}{}$ = 12.66	11.15	12.98

R-value calculations at 75°F mean temperature.

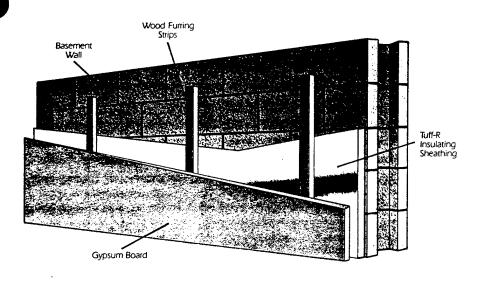
11.15

.079

BETTER In this case, all major work is completed for the home owner. Wood nailers the thickness of the Thermax to be applied are installed at the top and bottom of the walls. Thermax is then installed between the wood nailers with good construction adhesive. The home owner can later add gypsum wallboard or paneling by gluing the center of the material to the Thermax and nailing it top and bottom in to the wood nailers. Baseboard and top molding can also be installed easily with mechanical fasteners.



Thermax Sheathing Thickness:	3/4"	1"	11/2"	2"	21/2"	3″
R-value @ 75°F Mean Temp:	5.4	7.2	10.8	14.4	18.0	21.6



BEST Today, many builders use the costly approach of furring out basement walls with two by four studs between which fiberglass insulation and a vapor retarder are installed. After electrical wiring is run through the walls, gypsum wallboard is applied.

The Tuff-R system is at least twice as fast to install. Tuff-R Insulating Sheathing is temporarily adhered to the walls and furring strips are installed either 16 or 24 inches on center. The furring strips can allow the use of flat electrical boxes and create a reflective dead air space which adds an R-value of 2.8 at no cost.

The furring also provides a raceway for wiring and a sound base for nailing gypsum wallboard or paneling in place to produce finished basement walls which appear expensive, but are in fact economical.

Tuff-R Insulating Sheathing Nominal Board Thickness:	3/4"	1"	11/2"	2"
Product R-value	5.8	7.7	11.5	15.4
System R-value* w/¾" air space @ 75°F Mean Temp:	8.6	10.5	14.3	18.2

^{*}System R-value calculated through cavity and includes 1/2" gypsum board (R = .45), 3/4" reflective air space (R = 2.77) and Tuff-R only Calculations based on ASHRAE Handbook of Fundamentals.

Do not leave Tuff-R insulating Sheathing exposed, it must be covered with minimum 1/2" gypsum board or equivalent thermal barrier interior finish.

Wamings

Thermax® Sheathing

Warning: Celotex® Thermax foil-faced products should only be used in strict accordance with Celotex' recommended uses and application instructions. The use of these Thermax products or other thermal insulations, in conjunction with exposed combustible building components, may contribute to rapid spread of fire. Thermax foil-faced products by themselves, or Thermax foil-faced products used in conjunction with non-combustible building components, will burn but will not contribute to rapid spread of fire. The above conclusions are based upon fire tests conducted on unoccupied structures and upon nationally recognized fire tests. Thermax foil-faced products, like wood and other organic materials, can release toxic smoke if ignited.

Tuff-R® Insulating Sheathing

WARNING: DO NOT LEAVE EXPOSED. THESE PRODUCTS WILL BURN AND, IF EXPOSED TO A FIRE OF SUFFICIENT HEAT AND INTENSITY, MAY BURN RAPIDLY. TUFF-R INSULATING SHEATHING PROD-UCTS. LIKE WOOD AND OTHER ORGANIC MATERIALS, CAN RELEASE TOXIC SMOKE IF IGNITED. TUFF-R INSULATING SHEATHING PRODUCTS SHOULD ONLY BE USED IN STRICT ACCORDANCE WITH CELOTEX' RECOMMENDED USES AND APPLICATION INSTRUCTIONS. TUFF-R INSULATING SHEATHING PRODUCTS MUST BE INSTALLED BEHIND MINIMUM 1/2" GYPSUM BOARD OR ITS EQUIVALENT THERMAL BARRIER INTERIOR FINISH.

Thermax Sheathing and Tuff-R Insulating Sheathing products, when applied in accordance with Celotex instructions, meet requirements of the model building codes, various insurance authorities and other requlatory bodies in a wide variety of recommended applications.

Characteristics, properties or performance of materials manufactured by The Celotex Corporation herein described are derived from data obtained under controlled test conditions. Celotex makes no warranties, express or implied, as to their characteristics, proper-

ties or performance under any variations from such conditions in actual construction. The Celotex Corporation assumes no responsibility for the effects of structural movement.

Any deviation from these instructions voids all warranties including implied warranties of merchantability and fitness for a particular purpose.

Thermax Sheathing and Tuff-R Insulating Sheathing products are protected by one or more of the following U.S. Patents:

3,903,346 4,028,158 4,169,921 4,346,133 3,940,517 4,043,719 4,284,683 4,386,983

4,411,949 4,572,865 RE30984

Additional Information

Further information concerning the products, systems, and test methods described in this publication can be obtained by contacting The Celotex Corporation, Tampa, or one of its Regional Sales Offices listed below.

The systems in this book are for illustration purposes only. The structural integrity of such systems is the responsibility of the design engineers, architects, component manufacturers, applicators and erectors.

Regional Sales Offices, Manufacturing Plants and Export Sales

ATT ANTA AIL/NIA 2700 Cumberland Parkway Suite 330 Atlanta, Georgia 30339 Phone (404) 436-8005 800-654-7332 (Outside Georgia)

CHICAGO Touthy Office Plaza 1400 E. Touthy Ave. Suite 336 Des Plaines, Illinois 60018 Phone (708) 298-1943

CINCINNATI 9403 Kenwood Road Suite B 201 Cincinnati, Ohio 45242 Phone (513) 792-8210 800-543-8638

13601 Preston Road Suite 628 West Phone (214) 661-1406 800-523-4684 800-443-0064 (Texas only)

PHILADEL PHIA 996 Old Eagle School Road Wayne, Pennsylvania 19087 Phone (215) 964-1925

WESTERN RUILDING PRODUCTS REGION 6400 Stevenson Boulevard Fremont, California 94538 Phone [415] 490-0491 800-227-1216

MANUFACTURING PLANTS 1255 North 5th Street Charleston, Illinois 61920 Phone (217) 348-8176 800-637-2044

1500 John Tipton Blvd. Pennsauken, New Jersey 08110 Phone (609) 663-2626 800-257-5313

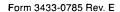
PO Rox 5884 Texarkana, Arkansas 75501 Phone (501) 774-3685 800-THERMAX

EXPORT Jim Walter International Sales Corporation 4010 Boy Scout Boulevard Tampa, Florida 33607 FAX: (813) 873-4287 Telex No. 159788 JWISC

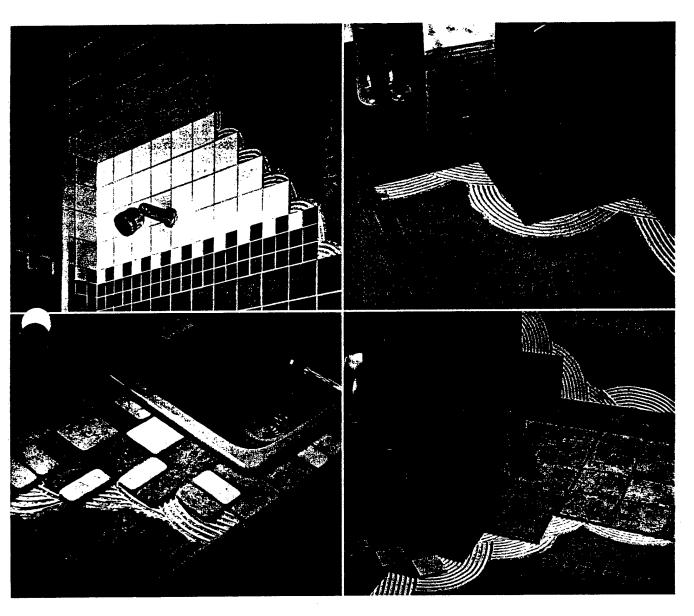
Celotex, Thermax, Tuff-R, and Quik-R are trademarks of The Celotex Corporation



THE CELOTEX CORPORATION POST OFFICE BOX 31602 TAMPA, FLORIDA 33631



DUROCK Multi-Purpose Cement Board Systems



The best substrate for ceramic tile

- Water resistant
- Easy to score and snap
- Won't shrink and swell like wood substrates

DUROCK Cement Board, the multi-purpose building panel, offers architects, builders and tile contractors a strong, water-damage resistant tile base for tub and shower areas. Also an ideal underlayment for tile on floors and counter tops in new construction and remodeling. Board is readily applied over wood or steel framing spaced 16" o.c. with DUROCK Wood or Steel Screws or galvanized roofing nails. After joints are treated, ceramic wall or floor tile is applied using latex fortified mortar or Type I organic adhesive.

The ½" thick DUROCK Cement Boards are listed by Underwriters Laboratories, Inc., for use with UL-listed solid-fuel room heaters and fireplace stoves. Used as a wall shield, board reduces by two-thirds the manufacturer-specified clearance (minimum 12") between room heater or stove and combustible wall surface. Board may also be used as a floor protector in place of one layer of ½" thick millboard. For hearth extensions see Specification 3.6B on page 8.

In addition to standard ½" DUROCK Cement Board, DUROCK Underlayment is available for floors and counter tops. Its nominal ½" thickness helps eliminate transition trim when abutting carpet or wood flooring and helps minimize level variations with other finish materials. Its 4'x4' size is easy to handle and helps cut down on waste. Applies directly over old substrate on counter tops to save time.

DUROCK Exterior Cement Board is preferred by many applicators for its added strength in interior applications. However, its primary use is as a base for USG Exterior Textured Finish and other finish options used in building exteriors. See SA-700 USG Exterior Products & Systems for complete information on the applications of this product.

Features and Benefits

High performance—DUROCK Cement Board possesses high flexural and compressive strength, hardness and impact resistance.

Smooth or textured—Board is smooth on one side for mastic applications, textured on other side for mortar applications. Textured

Dimensionally stable—Board is rigid and exhibits excellent water-damage resistance properties as a permanent tile base. It will not swell, soften, decay, delaminate or disintegrate.

surface enhances bonding and reduces tile slip.

Fire-resistant—DUROCK Cement Board is a non-combustible panel. Assemblies with ½" DUROCK Cement Board have achieved 1 and 2 hr. fire-resistance ratings. Surface burning characteristics for DUROCK Cement Board: flame spread 5, smoke developed 0.

Lighter weight—At approximately 3 psf, the ½" thick board weighs only one-fourth the weight of a 1" thick metal lath and cement plaster hed

Easy installation—DUROCK Cement Board is easy to cut and fasten with DUROCK Screws or galvanized roofing nails. Simple dry panel application eliminates cement mixing and drying time, shortening job schedules and lowering in-place cost.

Sound control—Sound isolation ratings up to 65 STC are offered with steel-framed partitions.

Convenient sizes—DUROCK Cement Board may be ordered in sizes to meet job requirements. $\frac{1}{2}$ and $\frac{1}{2}$ thicknesses, custom lengths from 32" to 96", and 32", 36" or 48" widths are available.

Versatile application—DUROCK Cement Board provides a smooth, sound base for glass and ceramic mosaics; ceramic and quarry tile; lugged tile; USG Exterior Textured Finish; thin stone tile and thin brick. Suitable for application to wood or steel framing spaced 16" o.c. in new construction and in remodeling. Board is ideal for use in partitions, walls, floors, soffits and ceilings in wet or dry areas. It is highly durable in high-moisture areas found in baths, showers, kitchens and laundry rooms. Also adaptable for fences, fireplace fronts, mobile home skirting, agricultural buildings, UL-listed wall shield/floor protector, garage wainscoting and exterior chimneys.

DUROCK Cement Board Systems

Limitations

- Systems using DUROCK Cement Board are designed for positive or negative uniform loads up to 30 psf. (See SA-700 USG Exterior Products & Systems for complete information on finishing DUROCK Exterior Cement Board and for uniform loads up to 40 psf.)
- 2 Maximum stud spacing: 16" o.c. (24" o.c. for cavity shaft wall assembly); maximum allowable deflection, based on stud properties only, L/360. Maximum fastener spacing: 8" o.c. for wood and steel framing; 6" o.c. for ceiling applications.
- 3 Maximum dead load for ceiling system is 7.5 psf.
- 4 Steel framing must be 20 ga. or heavier.
- 5 Do not use drywall screws or drywall nails.
- 6 Not recommended for vinyl flooring.

Product Data

Material: Formed in a continuous process of aggregated portland cement slurry with polymer-coated, glass-fiber mesh completely encompassing edges, back and front surfaces.

Edges: Formed smooth—Patent No. 4,916,004.

Ends: Square cut.

Sizes and Packaging

	Thickness		Width		Leagth	Ship. Units	
Туре	Standard	Custom ⁽¹⁾	Standard	Custom ⁽¹⁾	Standard	Custom(1)	(pcs) ⁽²⁾
Cement Board	V."	*	32", 36"	48"	5'	3' to 8'	50
	1/2"	Х"	32"		8'	4' to 8'	30
Underlayment	% "		48"		4'	4' to 8'	40
Exterior Cement Board	Уг"	X "	48"	32"	8'	4' to 10'	20

(1) Minimum quantity required for custom sizes

(2) Stretch-wrapped and shipped in packaging units as shown.

Building Code Data

See National Evaluation Service Report Nos. 259 and 396 for allowable values and/or conditions of use concerning material presented in this document. These reports are subject to reexamination, revisions and possible changes.

Standards

DUROCK Cement Board exceeds the ANSI Standards for cementitious backer units (CBU). See ANSI A118.9-1990 for Test Methods and Specifications for CBU and ANSI 108.11-1990 for Interior Installation of CBU.





LISTED 34L2

For floor protectors

and wall shields.

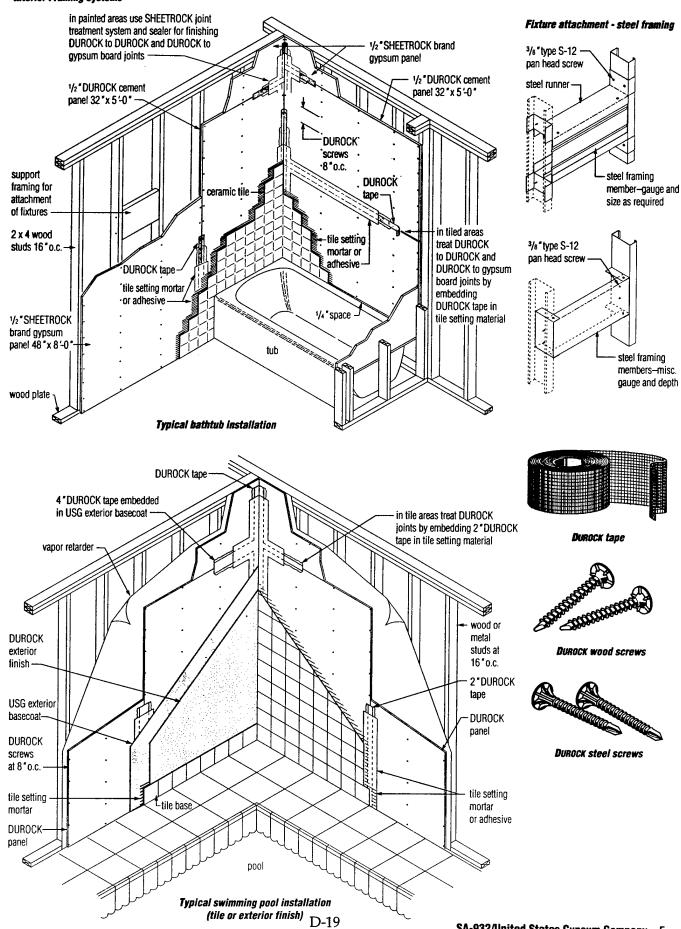
Typical Physical Properties

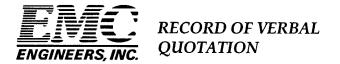
Property	ASTM test reference	Cement board value	Under- layment value	Exterior board value
Flexural strength-psi	C947-81	750	1250	1000
Indentation strength— psi 1" dia. disc @ 0.02" indent.	D2394	2300	2300	2300
Uniform load-psf studs 16" o.c.		30 max.	_	40 max.
Water absorption-% by wt. 24 hrs.	C473-84	10	10	10
Nail pull resistance—lb. 0.4" head diameter (wet or dry)	C473-84	125	_	125
Weight—psf	C473-84	3	2	3
Freeze/thaw resistance—procedure B number of cycles with no deterioration	C666-84	100	100	100
Surface burning characteristics—flame/smoke	E84-84	5/0	5/0	5/0
Therma! "R"/k value	C177	0.26/1.92		0.26/1.92
Standard method for evaluating ceramic floor tile installation systems	C627	Residential	Residential	
Min. bending radius!—ft.	_	8		8

(1) Requires special framing. Details available on request.

SA-932/United States Gypsum Company 5

Interior Framing Systems





2750 South Wadsworth Blvd. Suite C-200 Denver, Colorado 80227-3400

303/988-2951 Fax: 303/985-2527

DATE:

29 January 1996

PROJECT:

Limited Energy Study, Insulate

Brick Buildings

COMPANY:

Missouri Drywall

ADDRESS:

St. Louis, Missouri

LOCATION:

Fort Leonard Wood, Mo.

PHONE NO.:

1-314-731-2282

PERSON CONTACTED: Len

Quotation Received By: Alan Niemeyer

DUROCK Cement Board:

1/2" - 4' x 8' sheet @ \$25.28

5/8" - 4' x 8' sheet @ \$28.96

Shipping Cost is based on one man delivering 4,000 SF of DUROCK (125 sheets).

- Shipping cost per SF = \$0.05

Shipping Cost:

\$200.00

(F.O.B.)

ANNUAL ENERGY SAVINGS SUMMARY FOR BRANCH PXs - BUILDINGS 639, 744, 835, & 1026

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
1	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
639	69.66	61.40	8.26	33.80	32.50	1.30	610.49	561.38	49.11

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 639	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
744	6,240	5,413	1.153	8.26	9.52	1.30	1.50	49.11	56.61
835	6,240	5,413	1.153	8.26	9.52	1.30	1.50	49.11	56.61
1026									

^{*}Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak			Annual
1	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
639	69.66	60.75	8.91	33.80	32.50	1.30	610.49	558.44	52.05

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
]			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 639	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
744	6,240	5,413	1.153	8.91	10.27	1.30	1.50	52.05	60.00
835	6,240	5,413	1.153	8.91	10.27	1.30	1.50	52.05	60.00
1026	No Evalua	ation Perfo	rmed on t	his Buildir	ıg				

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR BRANCH PXs - BUILDINGS 639, 744, 835, & 1026

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
639	\$22,547

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 639	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
744	6,240	-	-	\$29,219	-
835	6,240	5,413	1.153	\$22,547	\$25,992
1026	8,533	N/A	N/A	N/A	N/A

^{*}Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
639	\$24,302

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 639	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
744	6,240	-	-	\$30,958	-
835	6,240	5,413	1.153	\$24,302	\$28,015
1026	8,533	N/A	N/A	N/A	N/A

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

		LOCATION:	Fort Leonard W	ood .	REGION: 2 (Missouri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Energy	Study, Insi	ulate Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INV	ESTMENT:	BLDG 639 - INS	STALL 3.5"	FIBERGLASS BATT	INSULATION ON V	WALLS	
	A.	CONSTRUCTION COS	т .	=			\$19,953	
	В.	SIOH COST	(7.0%	of 1A) =			\$1,397	
	C.	DESIGN COST	(6.0%	of 1A) =			\$1,197	
	D.	TOTAL COST	(1A +1	B + 1C) =			\$22,547	
	E.	SALVAGE VALUE OF	EXISTING EQUI	PMENT =			\$0	
	F.	PUBLIC UTILITY COM	PANY REBATE :	=			\$0	
	G.	TOTAL INVESTMENT	(1D -	1E -1F) =			>	\$22,547
2.	ENE	RGY SAVINGS (+) OR	COST (-):					
	DAT	E OF NISTIR 85-3273-	10 USED FOR D	DISCOUNT	FACTORS:	<u>JAN '96</u>		
		ENERGY	FUEL COS	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
		SOURCE	\$/MBTU (1) ME	STU/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5)	
	A.	ELECT.	\$7.33	8.26	\$61	13.80	\$835	
	В.	DIST	\$0.00	0	\$ 0	0.00	\$O	
	C.	NAT GAS	\$5.30	49.11	\$260	17.76	\$4,623	
	D.	COAL	\$0.00	0	\$0	0.00	\$O	
	E.	ELEC. DEMAND			\$96	13.47	\$1,300	
	F.	TOTAL		57.37	\$417		>	\$6,757
3.		I-ENERGY SAVINGS (+ ANNUAL RECURRING 1 ANNUAL MAINTEN 2 3	(+/-)		\$0 \$0 \$0		\$0 \$0 \$0	
		4 TOTAL ANNUAL D	SC. SAVINGS (+) / COST	\$O		\$0	
	В.	NON-RECURRING (+/	-)					
		ITEM	SA	VINGS (+) ST(-) (1)	YEAR OF OCCURRENCE (2)	DISCOUNT FACTOR (3) (TABLE A-2	DISCOUNTED SAVINGS/COST (4)	
		a. BASELINE EQUIP. R	EPLCMNT.				\$0	
		b.					\$O	
		c.					\$0	
		d.					\$0	
		e.					\$0	
		f. TOTAL		\$ 0			\$O	
	C.	TOTAL NON-ENERGY	DISCOUNTED S	AVINGS (+	+) OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	ST YEAR DOLLAR SAV	INGS (+) / COS	TS (-)	(2	F3+3A4+(3Bf1/I	Economic Life))	\$417
5.	SIM	PLE PAYBACK (SPB) IN	YEARS (MUST	BE < 10 Y	YEARS TO QUALIFY)	(1G/4) =		54.03
6.	тот	AL NET DISCOUNTED	SAVINGS			(2F5 + 3C) =		\$6,757
7.	DIS	COUNTED SAVINGS-TO	D-INVESTMENT	RATIO (SIF	R)	(6/1G) =		0.30
		(MUST HAVE SIR > 1	.25 TO QUALIF	Y)				

ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	1	P	-
PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woo	od, MO			DATE PREPARED	PARED	18-F	18-Feb-96
ENGINEER	ë.	EM C Engineers, Inc.					ESTIMATOR	JR.	Ö	D. Sinz
		Denver, CO					СНЕСКЕВ ВУ	ВУ		A. Niemeyer
				MA	MATERIAL COST	Ţ		LABOR COST	T	
No.	Code	Item Description	Unit of Measure	Ouantity	Cost	Total	Crew/ Worker	Hours/	Total	IATOT
-		BUILDING 639		,	1000		240	5	Olai	-012
2		INSTALL 3.5" BATT INSULATION ON WALLS			: 44					
က										
4				-						
2	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	3662.0	\$0.18	\$664	1-CARP	0.007	\$673	\$1,337
ဖ	۵	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	\$0.20	\$704	2-CARP	0.017	\$3,140	\$3,844
	NSI.		L.	2255.0	\$0.24	\$531	F-2	600.0	\$1,118	\$1,650
∞	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	\$0.07	\$245	1-PORD	0.01	\$884	\$1,128
ဘ	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	E.	1.0	\$0.00	\$0	1-SSWK	2.46	\$71	\$71
2	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	E.	1:0	\$0.00	S	1-SSWK	2.705	\$78	\$78
= 5	RFCO	RELOCATE FAN COIL UNIT	Ë	2.0	\$20.30	\$41	Q-6	2.67	\$992	\$1,033
12	REES		Ë	1.0	\$0.00	\$0	1-ELEC	1.5	\$46	\$46
13	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	\$8.85	\$18	1-ELEC	0.844	\$51	\$69
14	REO	RELOCATE ELECTRICAL OUTLET	Æ	10.0	\$7.97	\$80	1-ELEC	0.896	\$273	\$352
5	RFAPB	RELOCATE FIRE ALARM PULL BOX	Ē	1.0	\$0.00	\$0	1-ELEC	1.6	\$49	\$49
ا ا ا	RWHD	RELOCATE WALL HAND DRYER	E.	1.0	\$0.00	\$0	1-CARP	3.2	\$84	\$84
1,	KAI	RELOCATE CEILING TILE - 4'-0" FROM WALL	<u>п</u> .	309.0	\$1.14	\$354	1-CARP	0.134	\$1,088	\$1,442
82	KKG	RELOCATE RETURN AIR GRILLE	Ë.	1.0	\$0.00	\$0	1-SHEE	4	\$120	\$120
ည (IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	147.0	\$0.84	\$123	2-CARP	0.02	\$154	\$278
20	LST	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	\$1.83	\$269	2-TILE	0.084	\$598	\$867
21				i	:					
22										
24										
25							1000001110001110001100011000110001100011000110001100011000110001100011000110001100011000110001100011000110001			
26										
27		SUBTOTAL		! !		\$3,028			\$9,420	\$12,449
28	DIFF	DIFFICULTLY FACTOR			2%				\$471	\$471
53		SUBTOTAL				\$3,028			\$9,891	\$12,920
၉ ႏ	HO	OVERHEAD			17%	\$515			\$1,682	\$2,196
က်	10	SUBTOTAL	:			\$3,543			\$11,573	\$15,116
32	PRO	PROFIT			40%	\$354			\$1,157	\$1,512
	!	SUBTOTAL	:			\$3,897			\$12,730	\$16,628
& % 4 %	CONT COST	CONTINGENCY	:		20%	\$779			\$2,546	\$3,326
3	ויסואר ככ					\$4,677			\$15,276	\$19,953

Interference Inte	FNGNF	FR'S OF	FNGINFFR'S OPINION OF PROBABLE COST					SHEET	1	R	-
Hear Reference Code Hear Description Hear Reference Hear Description Hear Reference Hear Description Hear Reference Hear Description Hear Descrip	PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Lec	onard Woc	od, MO			DATE PRE	PARED	18-F	-ep-96
Particle	ENGINEER		E M C Engineers, Inc.					ESTIMATO	٦. ا	0 4	Sinz
Item Refer Item Description Unit of Code Item Description Item Descr			Denver, CO					CHECKED	BY	۲	emeyer
Interneter Hern Description Unit of Coots Total Worker Unit Total Total Coots Hours Looke Look					MA		1	_ 1	ABOR COS		
BYLLDING 744 NISTALL 3-12" BATT INSULATION OWALLS S. 662.0 Sto.18 S664 1-CARP 0.007 S573 S18 S664 S. 1440 S1440		Item Refer Code	Item Description	Unit of Measure	Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
INSTALL 3-F BATT INSULATION ON WALLS SF. 36650 St. 768 S. 20.08 St. 716 St. 708 St. 708 St. 716 St. 708 St. 708 St. 716 St. 708 St. 716 St. 716 St. 708 St. 716 St			BUILDING 744								
13-12 NSTALL 3-17" BATTI NSULATION S.F. 3662.0 \$0.16 \$5644 -C-ARP 0.007 \$5973 \$9714 15-12	2										
19-1/22 INSTALL 3-1/2" BATT INSULATION S.F. 3662.0 \$0.18 \$664 1-CARP 0.007 \$673 58.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.140 19.	3						Manager of the state of the sta				
19-102 INSTALL 12" BATT INSTALL 17" BATT INSTALL 12" BATT INSTALL 2" BASING SIGN SOLD SOLD SOLD SOLD SOLD SOLD SOLD SOLD	4						1000	0000	2000	\$670	64 227
ID INSTALL TAPED & SANDED S.F. 3515.0 \$0.24 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0.047 \$0	2	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	3662.0	\$0.18	\$554	1-CARP	0.007	6704	41,337
STATE STAT	9	۵	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	\$0.20	\$704	2-CARP	0.017	\$3,140	43,844
TICP INSTALL TWO COATES OF PAINT ON DRYWALL S.F. 3662.0 \$0.07 \$244 1-PORM 2.884 3.1 R25CS RELOCATE 24X8/2 CLOTHING SHELVES E.A. 1.0 \$0.00 \$0 1-SSWM 2.46 \$3.1 R25CS RELOCATE FAIN COIL UNIT E.A. 2.0 \$0.00 \$0 1-SSWM 2.706 \$3.71 R25CS RELOCATE FAIN COIL UNIT E.A. 2.0 \$0.00 \$0 1-SSWM 2.706 \$3.71 RES RELOCATE ELECTRICAL LICHT SWITCH E.A. 2.0 \$88.82 \$18 1-ELEC 0.844 \$5.17 R25C RELOCATE ELECTRICAL LICHT SWITCH E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.17 R25C RELOCATE ELECTRICAL LICHT SWITCH E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.17 RAPA RELOCATE ELECTRICAL LICHT SWITCH E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.17 RAPA RELOCATE ELECTRICAL LICHT SWITCH E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.17 RAPA RELOCATE ELECTRICAL LICHT SWITCH E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.17 RAPA RELOCATE ELECTRICAL LICHT SWITCH E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.108 RAPA RELOCATE RELOCATE SALUE E.A. 1.0 \$0.00 \$0 1-ELEC 0.846 \$5.108 RAPA RELOCATE RELURING TILE 4-0" FROM WALL E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.108 RAPA RELOCATE RELURING TILE 4-1/4" x 4-1/4" TILE E.A. 1.0 \$0.00 \$0 1-ELEC 0.844 \$5.108 RAPA RELOCATE RELEPHONE BOOTHS E.A. 1.0 \$0.00 \$0.00 \$0 1-ELEC 0.844 \$5.108 RAPA RELOCATE RELEPHONE BOOTHS E.A. 1.0 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 RAPA RELOCATE RELEPHONE BOOTHS E.A. 1.0 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 RAPA RELOCATE RELEPHONE BOOTHS E.A. 1.0 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00	7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC		2255.0	\$0.24	\$531	F-2	600.0	\$1,118	\$1,650
REGES RELOCATE 24/88/2 CLOTHING SHELVES EA 1.0 \$0.00 \$0 L-SSWK 2.46 \$71 ROGS RELOCATE 24/88/2 CLOTHING SHELVES EA 1.0 \$20.30 \$54 \$0.6 \$57 \$592 \$78 RECONTE CAVERAZ CLOTHING SHELVES EA 1.0 \$20.30 \$54 \$0.6 \$57 \$592 \$78 RECONTE ELECTRICAL EXIT SIGN EA 1.0 \$20.30 \$54 \$0.6 \$56 \$57 \$592 \$78 RECONTE ELECTRICAL LEMT SWITCH EA 1.0 \$80.00 \$50 1-ELEC 0.846 \$25 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20 \$20	80	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	\$0.07	\$245	1-PORD	0.01	\$884	\$1,128
RELOCATE 30x8x2**CLOTHING SHELVES	6	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	1.0	\$0.00	\$0	1-SSWK	2.46	\$71	\$71
RECOATE FAN COIL UNIT EA 2.0 \$20.30 \$41 Q-6 567 \$992 \$18 RECOATE FAN COIL UNIT EA 1.0 \$0.00 \$50 T-ELEC 0.844 \$51 \$18 RECOATE ELECTRICAL LOITT SWITCH EA 1.0 \$0.00 \$50 T-ELEC 0.844 \$573 \$18 RECOATE ELECTRICAL UNITET EA 1.0 \$0.00 \$50 T-ELEC 0.844 \$573 \$18 RECOATE ELECTRICAL UNITET EA 1.0 \$0.00 \$50 T-ELEC 0.844 \$573 \$18 RECOATE ELECTRICAL UNITET EA 1.0 \$0.00 \$50 T-ELEC 0.844 \$573 \$18 RECOATE ELECTRICAL UNITET EA 1.0 \$0.00 \$50 T-ELEC 0.844 \$573 \$18 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108 \$108	10	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	EA.	1.0	\$0.00	\$0	1-SSWK	2.705	\$78	\$78
REES RELOCATE ELECTRICAL ISMIT SIGN EA 10 \$0.00 \$0 1-ELEC 1.5 \$46 RELOCATE ELECTRICAL LIGHT SWITCH EA 2.0 \$8.82 \$1.6LEC 0.844 \$57 RAPE RELOCATE ELECTRICAL LIGHT SWITCH EA 1.0 \$0.00 \$0 1-ELEC 1.6 \$49 RAPE RELOCATE FIRE ALARM PULL BOX EA 1.0 \$0.00 \$0 1-ELEC 1.6 \$49 RWHD RELOCATE FIRE ALARM PULL BOX EA 1.0 \$0.00 \$0 1-CARP 3.2 \$84 RWHD RELOCATE CELLING TILE - 4-0* FROM WALL L.F. \$0.00 \$0 \$0 1-CARP \$1.08 INSTALL 1/2* WATERPER BRD - TAPED & SANDE S.F. 147.0 \$0.04 \$1.5 \$1.6 \$1.08 ICT INSTALL CERAMIC TILE - 4-1/4* x + 1/4* TILE E.A. 1.0 \$0.00 \$0 \$2.0 \$1.0 RTB RELOCATE RELEPHONE BOOTHS E.A. 1.0 \$0.00 \$0 \$2.0 \$1.0	1	RFCU	RELOCATE FAN COIL UNIT	Ŗ.	2.0	\$20.30	\$41	Q-6	5.67	\$992	\$1,033
RELS RELOCATE ELECTRICAL LIGHT SWITCH EA 2.0 \$8.82 \$1.6 Lec 0.844 \$51 REDO RELOCATE ELECTRICAL LIGHT SWITCH EA 1.0 \$7.97 \$8.0 LELEC 0.86 \$27.3 RAPAB RELOCATE ELECTRICAL LUGHT EA 1.0 \$0.00 \$0 1-ELEC 1.6 \$49 RWHD RELOCATE WALL HAND DRYER EA 1.0 \$0.00 \$0 1-CARP 3.2 \$89 RAT RELOCATE CELLING TILE - 4-0° FROM WALL L.F. 309.0 \$1.14 \$35.0 \$1.68 \$1.08 INSTALL CERAMIC TILE - 4-10° TROM S.F. 47.0 \$0.80 \$2.0 \$1.0 \$1.08 \$1.08 INSTALL CERAMIC TILE - 4-10° TROM S.F. 47.0 \$0.80 \$2.0 \$2.0 \$1.08 \$1.08 RTB RELOCATE REPHONE BOOTHS EA 1.0 \$0.00 \$0 \$0 \$1.04 \$1.08 NSTALL CERAMIC TILE - 4-10° TALLE S.F. 47.0 \$1.83 \$2.0 \$1.0 \$1.0<	12	REES	RELOCATE ELECTRICAL EXIT SIGN	Ë	0.	\$0.00	0\$	1-ELEC	1.5	\$46	\$46
REO RELOCATE ELECTRICAL OUTLET EA 10.0 \$7.97 \$80 1 EC 0.896 \$27.3 RAMD RELOCATE ELECTRICAL OUTLET EA 1.0 \$0.00 \$0 1 EC 1.6 \$49 RWHD RELOCATE FIRE ALARM PULL BOX EA 1.0 \$0.00 \$0 1 EC 1.6 \$49 RAMD RELOCATE WALL HAND DRYRE EA 1.0 \$0.00 \$0 1.2 ERP 0.134 \$1.08 RAG RELOCATE RETURN AIR GRILLE EA 1.0 \$0.00 \$1.5HE 4 \$1.08 INGT INSTALL 1/2" WATERPRE RRD - TAPED & SANDE S.F. 147.0 \$0.08 \$1.5HE 0.02 \$1.54 RAB RELOCATE RETURN AIR GRILLE E.A 1.0 \$0.00 \$0 1.5HE 4 \$1.08 RAB RATALL 1/2" X-4 1/4" TILE S.F. 1.0 \$0.00 \$0 3.CARP 4.8 \$3.783 BIFF DIFF SUBTOTAL CONT \$2.0 \$3.543 \$1.5	13	RFIS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	\$8.82	\$18	1-ELEC	0.844	\$51	\$69
RFAPB RELOCATE FIRE ALARM PULL BOX E.A. 1.0 \$0.00 \$0 1-ELEC 1.6 \$49 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.0 1.	14	REO	RELOCATE ELECTRICAL OUTLET	EA.	10.0	\$7.97	\$80	1-ELEC	0.896	\$273	\$352
RWHD RELOCATE WALL HAND DRYER EA	15	REAPB	RELOCATE FIRE ALARM PULL BOX	EA.	1.0	\$0.00	\$0	1-ELEC	1.6	\$49	\$49
RAT RELOCATE CEILING TILE - 4-0° FROM WALL L.F. 309.0 \$1.14 \$354 1-CARP 0.134 \$1.08B RG RELOCATE RETURN AIR GRILLE E.A. 1.0 \$0.00 \$0 1-SHEE 4 \$120 INSTALL 1/2" WATERPRE BRD - TAPED & SANDE S.F. 147.0 \$1.03 \$2.04 \$154 2 ICT INSTALL CERAMIC TILE, 4.14" x4.14" TILE E.A. 1.0 \$0.00 \$0 2.7LLE 0.004 \$5.783 RTB RELOCATE 8 TELEPHONE BOOTHS E.A. 1.0 \$0.00 \$0 3.CARP 48 \$3.783 DIFF DIFFICULTLY FACTOR E.A. 1.0 \$0.00 \$0 3.CARP \$48 \$13.204 \$5 OH OVERHEAD \$3.028 \$3.028 \$13.804 \$1.02 \$1.04 \$1.02 \$1.04 \$1.04 \$1.02 \$1.04 \$1.04 \$1.04 \$1.02 \$1.04 \$1.04 \$1.04 \$1.04 \$1.04 \$1.04 \$1.04 \$1.04 \$1.04 \$1.04	16	RWHD	RELOCATE WALL HAND DRYER	Ē	1.0	\$0.00	\$0	1-CARP	3.2	\$84	\$84
RRG RELOCATE RETURNAIR GRILLE EA. 1.0 \$0.00 \$0 1.5 LSCARP \$1.20 INSTALL 1/2" WATERPRE BRD - TAPED & SANDE S.F. 147.0 \$0.84 \$1.23 2-CARP 0.02 \$154 ICT INSTALL 1/2" WATERPRE BRD - TAPED & SANDE S.F. 147.0 \$0.84 \$1.23 2-CARP 0.02 \$158 RTB RELOCATE 8 TELEPHONE BOOTHS EA. 1.0 \$0.00 \$0 3-CARP 48 \$3.783 DIFF SUBTOTAL SUBTOTAL \$1.0 \$3.028 \$1.3204 \$1.3504 \$2.367 OH SUBTOTAL SUBTOTAL \$1.0 \$3.543 \$1.521 \$1.7843 \$1.521 \$1.7843 \$1.521 \$1.7843 \$1.521 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843 \$1.7843	17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	L L	309.0	\$1.14	\$354	1-CARP	0.134	\$1,088	\$1,442
IMB-1/2 INSTALL 1/2" WATERPRE BRD - TAPED & SANDE S.F. 147.0 \$0.84 \$12.3 2-CARP 0.02 \$154 1.02 1.02 1.02 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03	6	RRG	RELOCATE RETURN AIR GRILLE	EĀ.	1.0	\$0.00	\$ 0	1-SHEE	4	\$120	\$120
ICT INSTALL CERAMIC TILE, 4-1/4" X 4-1/4" TILE S.F. 147.0 \$18.3 \$269 2-TILE 0.084 \$598 RTB RELOCATE 8 TELEPHONE BOOTHS EA. 1.0 \$0.00 \$0 3.0 CARP 48 \$3,783 SUBTOTAL SUBTOTAL \$1.0 \$3,028 \$13,204 \$5,000 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 <	19	IWB-1/2	A	S.F.	147.0	\$0.84	\$123		0.02	\$154	\$278
RTB RELOCATE 8 TELEPHONE BOOTHS EA. 1.0 \$0.00 \$0 3-CARP 48 \$3,783 SUBTOTAL \$13,7204 \$ DIFF DIFFICULTLY FACTOR \$13,204 \$ DIFF DIFFICULTLY FACTOR \$13,804 \$ DIFF DIFFICULTLY FACTOR \$13,804 \$ SUBTOTAL \$17,805 \$1,622 \$ PROFIT \$3,807 \$1,622 \$1,622 PROFIT \$3,807 \$1,784 \$1,784 CONT CONTINGENCY \$20,807 \$1,785 \$1,285 TOTAL COST \$6,8281 \$1,285 \$1,285 BEGION COST \$23,907 \$1,285 \$1,285 BEGION COST \$23,907 \$1,285 \$1,285 BEGION COST \$23,907 \$23,907 \$1,285 BEGION COST \$23,907 \$23,907 \$1,285 BEGION COST \$23,907 \$23,907 \$23,907 BEGION COST \$23,907 \$23,907 \$23,907	20	<u>5</u>	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	\$1.83	\$269		0.084	\$598	\$867
SUBTOTAL \$13,204 \$ DIFF DIFFICULTLY FACTOR \$600 \$13,204 \$ DIFF DIFFICULTLY FACTOR \$600 \$13,804 \$ SUBTOTAL \$13,804 \$13,804 \$13,804 \$13,804 \$13,804 \$13,804 \$14,622 \$14,622 \$14,622 \$14,622 \$14,622 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 \$17,844 <	21	RTB	RELOCATE 8 TELEPHONE BOOTHS	EA.	1.0	\$0.00	S S	_	48	\$3,783	\$3,783
SUBTOTAL \$13,204 \$ DIFF DIFFICULTLY FACTOR \$13,204 \$ SUBTOTAL \$1,364 \$ OH OVERHEAD \$2,357 \$16,221 \$ PRO PROFIT \$16,221 \$ \$16,221 \$ PRO PROFIT \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$1,784 \$1,784 \$1,784 \$1,784 \$1,784 \$1,784 \$1,784 \$1,784 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,285 \$1,	22										
SUBTOTAL \$0,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 \$10,020 <t< td=""><td>23</td><td></td><td></td><td></td><td></td><td></td><td>9000</td><td></td><td></td><td>¢12.204</td><td>£16 232</td></t<>	23						9000			¢12.204	£16 232
DIFF DIFFICULLY FACIOR \$3,028 \$13,864 \$ SUBTOTAL \$13,864 \$ \$13,864 \$ OH OVERHEAD \$13,867 \$13,867 \$13,867 \$13,867 \$15,221 \$ PRO PROFIT \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$17,843 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000 \$20,000	24					/03	070,04			4660	3660
SUBLICIAL \$CINT \$515 \$2,357 \$2,357 \$2,357 \$2,357 \$2,357 \$2,357 \$3,543 \$16,221 \$1,622 \$1,622 \$1,622 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162 \$2,162	25	HE I	- 1			2	\$3.028			\$13,864	\$16.892
OH OVERHEAD \$16,221 \$ SUBTOTAL \$16,221 \$ PRO PROFIT \$16,221 \$ SUBTOTAL \$1,622 \$1,622 SUBTOTAL \$1,622 \$1,622 SUBTOTAL \$1,622 \$1,622 SUBTOTAL \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$1,622 \$2,693 \$21,411 \$1,285 BESIGN COST \$2,83,981 \$1,285 TOTAL INVESTMENT \$5,238 \$23,981	97		SUBICIAL		1	170%	\$515			\$2,357	\$2,872
PRO PROFIT \$354 \$1,622 SUBTOTAL \$3,897 \$17,843 \$ \$17,843 \$ \$ \$17,843 \$ \$ \$ \$17,843 \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ <th< td=""><td>27</td><td>5</td><td>OVERHEAD</td><td></td><td></td><td>2</td><td>\$3.543</td><td></td><td></td><td>\$16,221</td><td>\$19,764</td></th<>	27	5	OVERHEAD			2	\$3.543			\$16,221	\$19,764
PRO PROFILE \$3,897 \$17,843 \$ SUBTOTAL \$0NT \$779 \$17,841 \$ CONT CONTINGENCY \$21,411 \$ TOTAL COST \$281 \$1,285 \$1,285 BESIGN COST \$5,238 \$23,981 \$ TOTAL INVESTMENT \$5,23,981 \$	07	0				10%				\$1,622	\$1,976
CONT CONTINGENCY \$3,569 \$3,569 TOTAL COST \$4,677 \$21,411 \$1,285 SIOH COST 6% \$281 \$1,285 DESIGN COST 6% \$281 \$1,285 TOTAL INVESTMENT \$5,238 \$23,981 \$	52 S	פאר	PROFIL			2	69			\$17,843	
TOTAL COST \$4,677 \$21,411 \$ SIOH COST 6% \$281 \$1,285 \$1,285 DESIGN COST 6% \$281 \$1,285 \$1,285 TOTAL INVESTMENT \$5,238 \$23,981 \$	5 5	TINO	CONTINCENCY	:		20%				\$3,569	
SIOH COST 6% \$281 \$1,285 DESIGN COST 6% \$281 \$1,285 TOTAL INVESTMENT \$5,238 \$23,981 \$	33	TOTALC		1	;	1	÷			\$21,411	\$26,088
DESIGN COST \$23,981 \$1,285 TOTAL INVESTMENT \$5,238 \$23,981 \$	3 5	SIOH COS				%9				\$1,285	
TOTAL INVESTMENT \$23,981	3 2	DESIGN C	ISC	:		%9	:			\$1,285	.
	35	TOTALIN	IVESTMENT				\$5,238			\$23,981	\$29,219

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LOCATION: Fort Leonard Wood REGION: 2 (Missouri) PROJECT NO: 1406-011 PROJECT TITLE: Limited Energy Study, Insulate Brick Buildings FISCAL YEAR: 1996 ANALYSIS DATE: 02/18/96 **ECONOMIC LIFE:** 20 PREPARED BY: D. Sinz 1. INVESTMENT: BLDG 639 - INSTALL 1.5" RIGID INSULATION ON WALLS A. CONSTRUCTION COST \$21,506 B. SIOH COST (7.0% of 1A) =\$1,505 C. DESIGN COST (6.0% of 1A) =\$1,290 D. TOTAL COST (1A + 1B + 1C) =\$24,302 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 F. PUBLIC UTILITY COMPANY REBATE = \$0 G. TOTAL INVESTMENT (1D - 1E - 1F) =----> \$24,302 2. ENERGY SAVINGS (+) OR COST (-): DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: **JAN '96 ENERGY FUEL COS SAVINGS** ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 8.91 \$65 13.80 \$901 B. DIST \$0.00 0 \$0 0.00 \$0 C. NAT GAS \$5.30 52.05 \$276 17.76 \$4,899 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$96 13.47 \$1,300 F. TOTAL 60.96 \$438 ----> \$7,100 3. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 2 \$0 \$0 3 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 ŝΩ B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$O b. \$0 c. \$0 d. \$0 ŚΩ f. TOTAL \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) =\$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3+3A4+(3Bf1/Economic Life)) \$438 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) =55.53 TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) =\$7,100

LIFE CYCLE COST ANALYSIS SUMMARY

(6/1G) =

0.29

7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR)

(MUST HAVE SIR > 1.25 TO QUALIFY)

ENGIN	EER'S OF	ENGINEER'S OPINION OF PROBABLE COST					SHEET	1	P	_
PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woc	od, MO			DATE PREPARED	PARED	18-	18-Feb-96
ENGINEER	R	E M C Engineers, Inc.					ESTIMATOR	JR.	<u>.</u>	D. Sinz
		Denver, CO					CHECKED	ВУ		A. Niemeyer
•		:	:	MA	MATERIAL COST	ST	I – I	ABOR COST	<u>,</u>	
No.	Item Refer Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
_		BUILDING 639								
2		INSTALL 1.5" RIGID INSULATION ON WALLS								
က										
4										
2	11-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3662.0	\$0.59	\$2,166	1-CARP	0.008	\$770	\$2,936
9	۵	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	\$0.20	\$704	2-CARP	0.017	\$3,140	\$3,844
7	FS		L.	1753.0	\$0.19	\$334	1-CARP	0.016	\$737	\$1,071
∞	TCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	\$0.07	\$245	1-PORD	0.01	\$884	\$1,128
6	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	Ē	1.0	\$0.00	\$0	1-SSWK	2.46	\$71	\$71
9	R30CS	ING SHE	EA.	1.0	\$0.00	\$0	1-SSWK	2.705	\$78	\$78
Ξ	RFCU	RELOCATE FAN COIL UNIT	Ë.	2.0	\$20.30	\$41	Q-6	5.67	\$992	\$1,033
12	REES	RELOCATE ELECTRICAL EXIT SIGN	EA.	0.1	\$0.00	\$0	1-ELEC	1.5	\$46	\$46
13	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	ĘĄ.	2.0	\$8.82	\$18	1-ELEC	0.844	\$51	869
4	REO	RELOCATE ELECTRICAL OUTLET	EA.	10.0	\$7.97	\$80	1-ELEC	0.896	\$273	\$352
15	RFAPB	RELOCATE FIRE ALARM PULL BOX	EA.	1.0	\$0.00	\$0	1-ELEC	1.6	\$49	\$49
9	RWHD	RELOCATE WALL HAND DRYER	ËĀ	1.0	\$0.00	\$0	1-CARP	3.2	\$84	\$84
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	Ľ.	309.0	\$1.14	\$354	1-CARP	0.134	\$1,088	\$1,442
\$	RRG	RELOCATE RETURN AIR GRILLE	EA.	1.0	\$0.00	\$0	1-SHEE	4	\$120	\$120
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	147.0	\$0.84	\$123	2-CARP	0.02	\$154	\$278
8	<u>5</u>	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	\$1.83	\$269	2-TILE	0.084	\$598	\$867
21										
22										
23							The state of the s			
24				:						The state of the s
22			:							
07		SIIBTOTAI	1			700 74			70.4	400
7.7		١.				44,004			68, L33	407'CI4
28	DIFF	DIFFICULTLY FACTOR		!	2%				\$457	\$457
83		SUBTOTAL				\$4,334			\$9,592	\$13,925
၉ ု	H	OVERHEAD			17%	\$737			\$1,631	\$2,367
31		SUBTOTAL				\$5,070			\$11,222	\$16,293
35	PRO	PROFIT			10%	\$507			\$1,122	\$1,629
33		SUBTOTAL	:	!	· ·	\$5,577			\$12,345	\$17,922
34		CONTINGENCY			20%	\$1,115			\$2,469	\$3,584
32	TOTAL COST)ST				\$6,693			\$14,813	\$21,506

ENGINEER'S		OPINION OF PROBABLE COST					SHEET	-	OF	1
PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woo	d, MO			DATE PREPARED	PARED	18-F	18-Feb-96
ENGINEER	2	E M C Engineers, Inc.					ESTIMATOR	78	Ö.	D. Sinz
		Denver, CO					CHECKED BY	ВҮ		A. Niemeyer
				MA	MATERIAL COST	ĭī		LABOR COS		
Line No.	Item Refer Code	ltem Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-		BUILDING 744								
2		INSTALL 1.5" RIGID INSULATION ON WALLS								
ი -			!							7 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
ر م	11-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3662.0	\$0.59	\$2,166	1-CARP	0.008	\$770	\$2,936
9	۵	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3515.0	\$0.20	\$704	2-CARP	0.017	\$3,140	\$3,844
	IFS	1	L.F.	1753.0	\$0.19	\$334	1-CARP	0.016	\$737	\$1,071
6	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3662.0	\$0.07	\$245	1-PORD	0.01	\$884	\$1,128
6	R25CS	RELOCATE 24'x8'x2' CLOTHING SHELVES	EA.	1.0	\$0.00	\$0	1-SSWK	2.46	\$71	\$71
10	R30CS	RELOCATE 30'x8'x2' CLOTHING SHELVES	ËĄ	1.0	\$0.00	\$0	1-SSWK	2.705	\$78	\$78
=	RFCU	RELOCATE FAN COIL UNIT	ËĄ	2.0	\$20.30	\$41	0-0 9-0	2.67	\$992	\$1,033
12	REES		EA.	1.0	\$0.00	\$0	1-ELEC	1.5	\$46	\$46
13	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	2.0	\$8.82	\$18	1-ELEC	0.844	\$51	69\$
4	REO	RELOCATE ELECTRICAL OUTLET	Ĕ.	10.0	\$7.97	\$80	1-ELEC	0.896	\$273	\$352
15	RFAPB	RELOCATE FIRE ALARM PULL BOX	EĄ.	1.0	\$0.00	\$0	1-ELEC	1.6	\$49	\$49
16	RWHD	RELOCATE WALL HAND DRYER	EA.	1.0	\$0.00	\$0	1-CARP	3.2	\$84	\$84
17	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	Ľ.	309.0	\$1.14	\$354	1-CARP	0.134	\$1,088	\$1,442
18	RRG	RELOCATE RETURN AIR GRILLE	ĘĄ.	1.0	\$0.00	\$0	1-SHEE	4	\$120	\$120
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	147.0	\$0.84	\$123	2-CARP	0.02	\$154	\$278
20	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	147.0	\$1.83	\$269	2-TILE	0.084	\$598	\$867
21	RTB	RELOCATE 8 TELEPHONE BOOTHS	E.	1.0	\$0.00	\$0	3-CARP	48	\$3,783	\$3,783
22										
23					1				0.00	1000
24		i	:			\$4,334			\$12,918	7C7'/ ¢
22	DIFF	DIFFICULTLY FACTOR			2%				\$646	\$646
56		SUBTOTAL				\$4,334			\$13,564	\$17,898
27	ОН	OVERHEAD			17%	\$737			\$2,306	\$3,043
28		SUBTOTAL				\$5,070			\$15,870	\$20,940
53	PRO	PROFIT			10%	\$507			\$1,587	\$2,094
30		SUBTOTAL				\$5,577			\$17,457	\$23,034
31	CONT	CONTINGENCY	:	: : !	20%	\$1,115			\$3,491	\$4,607
32	TOTAL CO	COST	!	:		\$6,693			\$20,949	\$27,641
33	SIOH COST				%9	\$405			\$1,257	\$1,658
34	DESIGN COST	TS			%9	\$402			\$1,257	\$1,658
35	TOTAL INVESTMEN	VESTMENT				\$7,496			\$23,462	\$30,958

E M C ENGINEERS,	INC					DATE	Esh Qe
		DICK 8:	DINCS			DATE:	Feb-96
PROJECT: LIMITED ENERGY S	•	RICK BUILL	DINGS			BY:	
CLIENT CONTRACT NO.: DAC	A 01-94D-0033					JOB:	1406.011
LOCATION: FT LEONARD WO	OD, MO.					CHK:	AJN
						FILE:	639Z1BHL
חווום	ING HEATING I	OAD C	ALCIII A	TION CHEE	т		
BUILL	ING REATING I	OAD C	ALCULA	HON SHEE	: 1		
BLDG NO: 639A	BLDG NAME:		CHANGE - Z	ZONE 1			
BLDG FUNCTION:	STORE AND SNA	CK BAR				# FLOORS	1
FLOOR AREA: (SQ. FT) SLAB PERIMETER: (FT)	3,706 192					# PLOURS -	
SEAD (EMMETER: (1 1)	102						
I. AREAS: ([] FIELD VERIFIE	D ELEVATION PLANS		r 				
WALLS GROSS	(CO ET)	NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS GLASS	(SQ. FT) (SQ. FT)	851	207	1,150	665 0	2,873 107	
PERSONNEL DOOR	(SQ. FT)	0	8	49	123	172	
INSULATED PANEL	(SQ. FT)	0	Ö	53	0	53	
WALLS, NET	(SQ. FT)	851	207	941	542	2,541	
ROOF AREA (OR CEILING ARE					(SQ. FT)	4,011	
INSULATED PANEL	(SQ. FT)		PERSONNI		(SQ. FT)	172	
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0	
II. CONSTRUCTION: ([] FIEL		OOF, WIN	DOW, DOC		21 15 21 51		D VALUE
WALLS: (SKETCH CROSS SEC	TION OF WALL)		-		OMPONEN OUTSIDE		R-VALUE 0.17
					4" FACE		0.43
					AIR SPAC		0.91
				4.	6" CMU		1.89
				5.			
				6.	INSIDE AI	D EII M	0.68
				, .		R-WALL =	4.08
						U = 1/R	0.245
				·			
ROOF: (SKETCH CROSS SECT	ION OF ROOF)				OMPONEN		R-VALUE
					OUTSIDE		0.17
					BUILT UP 1.5" INSU		6.00
						AIR SPACE	1.00
				5.	6" FB BA	TT INSUL	19.00
					ACOUSTI		1.35
				7.	INSIDE AI		0.68 28.54
					TOTAL	R-ROOF = U = 1/R	0.035
						- ,,,,	
GLASS TYPE:	PPG 'PENNVERN	ON' C.L. T	WNDV, SS	A, .88 S.C.		R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT					SLF	0.83
BASEMENT TYPE: INSULATED PANEL:	NONE					R-BASEM. R-PANEL	0.00 4.20
PERSONNEL DOOR TYPE:	METAL					R-PDOOR	2.56
III. INFILTRATION:							
TIGHT WALL H/M/L (SQ.FT.)			X CFM /	SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	M	2873	X CFM /		0.115	=	330
LEAKY WALL H/M/L (SQ.FT.)			X CFM /		0.000	=	0
DOOR OPENINGS / HR - SINGL				OPENING /HR	1.600		0
DOOR OPENINGS / HR - DOUB	LE DOORS	20		OPENING /HR	1.385 EM)	=	28 358
			TOTAL INF	-ILTRATION (C	F (VI)		358
UA PANEL	PANEL AREA	53		X PANEL "U"	0.238	=	13
UA PDOOR	PDOOR AREA	172		X DOOR "U"	0.391	=	67
UA WALL UA ROOF	WALL AREA ROOF AREA	2,488 4,011		X WALL "U" X ROOF "U"	0.245	=	622 141
UA GLASS	GLASS AREA	107		X GLASS "U"	0.621	=	66
UA SLAB	SLAB PERIM.	192		X SLF	0.830	=	159
UA BASEM.	B-WALL AREA	0		X BASE. "U"	0.000	=======================================	0
INFILTRATION	CFM	358		X A. T. F.	1.035	=	371

TOTAL UA (BTU/HR°F)

1,439

E M C ENGINEERS,						DATE:	Feb-96
PROJECT: LIMITED ENERGY	STUDY, INSULATE	BRICK BUIL	DINGS			BY:	DMS
CLIENT CONTRACT NO.: DAG	CA 01-94D-0033					JOB:	1406.011
LOCATION: FT LEONARD WO	OOD MO						
	50D, IIIO.					CHK:	NLA
						FILE:	639Z2BHL
BUIL	DING HEATING	LOAD C	ALCULA	TION SHEE	T		
BLDG NO: 639B	BLDG NAME:	POST FX	CHANGE - 2	ZONE 2			
BLDG FUNCTION:	GAME ROOM	TOOT EXC	SHANGE - Z	ZOIVE Z			
FLOOR AREA: (SQ. FT)	1,046	_				# FLOORS	1
SLAB PERIMETER: (FT)	92	-				•	
I. AREAS: ([] FIELD VERIFIE	D ELEVATION PLAN	IS)					
		NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS	(SQ. FT)	0	581	315	248	1,144	
GLASS	(SQ. FT)	0	0	27	0	27	
PERSONNEL DOOR OVERHEAD DOOR	(SQ. FT)	0	0	49	0	49	
WALLS, NET	(SQ. FT)	0	0	0	0	0	
ROOF AREA (OR CEILING ARE		ONDITIONE	581	239	248 (SQ. FT)	1,068	
OVERHEAD DOOR	(SQ. FT)		PERSONNE	EL DOOR	(SQ. FT)	1,046	
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0	
II. CONSTRUCTION: ([] FIEL	D VERIFIED WALL,	ROOF, WIN	DOW. DOC	OR TYPES)			
WALLS: (SKETCH CROSS SEC	CTION OF WALL)				MPONEN	TS I	R-VALUE
				1.	OUTSIDE	AIR FILM	0.17
				2.	4"BRICK/I	METAL PANAL	0.19
					AIR SPAC		0.91
				,	1.5" INSU 6" CMU	LATION	4.98
				6.	O CIVIO		1.89
					INSIDE AI	R FILM	0.68
					TOTAL F	R-WALL =	8.82
				}		U = 1/R	0.113
ROOF: (SKETCH CROSS SECT	ION OF ROOF)				MPONEN	rs	R-VALUE
					OUTSIDE		0.17
				2.	BUILT UP	ROOF	0.34
				F	1.5" INSU		6.00
					CEILING A		1.00
				<u>-</u>	6" FB BAT ACOUSTIC		19.00
				<u></u>	NSIDE AIF		1.35 0.68
				ļ	TOTAL R		28.54
				[U = 1/R	0.035
GLASS TYPE:	PPG 'PENNVERN	ON' C L TV	VNDV CCA	1 20 6 6			
LAB TYPE FLOOR:	CEMENT	OIN C.L. IV	*140 V, SSA	1, .00 S.C.		R-GLASS SLF	1.61
ASEMENT TYPE:	NONE					R-BASEM.	0.83
VERHEAD DOOR TYPE:	NONE					R-ODOOR	0.00
ERSONNEL DOOR TYPE:	METAL '	-				R-PDOOR	2.56
I. INFILTRATION:							
IGHT WALL H/M/L (SQ.FT.)			X CFM / S		0.000	=	0
EAKY WALL H/M/L (SQ.FT.)	L	1144	X CFM / S		0.092	=	105
OOR OPENINGS / HR - SINGLE	DOOR		X CFM / S	PENING /HR	0.000	=	0
OOR OPENINGS / HR - DOUBL		10		PENING /HR	1.600 1.385	=	0
				LTRATION (CF		=	119
UA ODOOR	ODOOR AREA	0					
UA PDOOR	PDOOR AREA	49		K DOOR "U" K DOOR "U"	0.000	=	0
UA WALL	WALL AREA	1,068		K WALL "U"	0.391	=	19
UA ROOF	ROOF AREA	1,046		K ROOF "U"	0.035		37
UA GLASS	GLASS AREA	27	X	GLASS "U"	0.621	=	17
UA SLAB UA BASEM.	SLAB PERIM.	92		X SLF	0.830	=	76
INFILTRATION	B-WALL AREA CFM	110		BASE. "U"	0.000	=	0
I TO LET TON	CLIVI	119		X A. T. F.	1.035	=	123
			TO	OTAL UA (BTU	/HR°F)		393

393

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE: PREPARED B 26-Jan-96

CHECKED BY:

FILE: BLDG: AJN 639AZ1 639A

ZONE:

	Ra	ites o	f Heat Gain from Occupants of Con	ditioned Spaces				
Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	10	4	Seated, light work, typing	Offices, hotels, apts	250	200	2,500	2,000
	6	5	Standing, light work, or walking slowly	Retail store, bank	270	220	1,620	1,320
	20	3	Seated Eating	Restaurant	225	325	4,500	6,500
TOTAL	36					TOTAL	8,620	9,820

	Peak Wattage Value for Lights											
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage							
1	39	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	6,552							
	3	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	252							
	27	18	Incandescent - 60w	60	1,620							
	0	0	0	0	0							
			0	0	0							
			0	0	0							
			0	0	0							
		0	0	0	0							
TOTAL	69			TOTAL	8,424							

			Peak Value for Internal Gains				
Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
1	<u> </u>		Microwave Oven	600	65%		2,048
-	2		Cash Register	. 60	20%		410
	5		Refrigerator (12 cu. ft.)	241	20%	1,205	4,113
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1							
				<u> </u>			
			Manufacture and the second sec				
1		·		TOTAL	49%	1,325	4,522

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE: 26-Jan-96

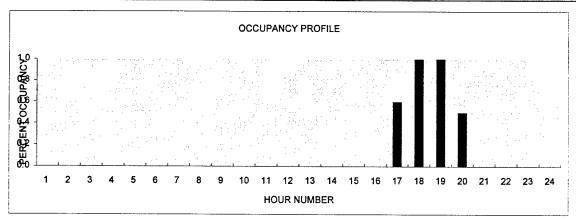
PREPARED BY: DMS

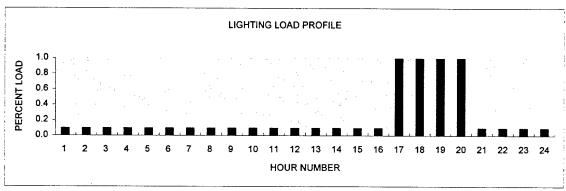
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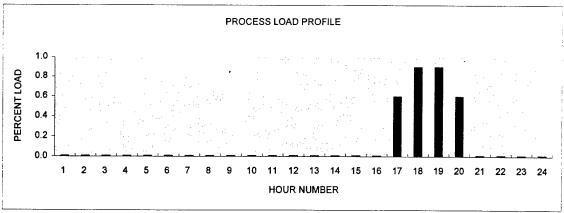
FILE: 639AZ1

BLDG: 639A ZONE:

BLDG	BLDG	TYPE OF			HOUR NUMBER																					
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	Post Exchan	OCCUPANC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	1.0	1.0	0.5	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.9	0.9	0.6	0.0	0.0	0.0	0.0







PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

PREPARED BY CHECKED BY:

DMS AJN

FILE: BLDG: 639Z2 639

2

ZONE:

	Rate	s of l	Heat Gain from Occupants of Co	nditioned Spaces		 		
Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
2	10	5	Standing, light work, or walking slowly	Retail store, bank	270	220	2,700	2,200
TOTA	10					TOTAL	2,700	2,200

	Peak Wattage Value for Lights										
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage						
2	2	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	336						
	32	18	Incandescent - 60w	60	1,920						
TOTA	34			TOTAL	2,256						

			Peak Value for Internal Gains				
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
2	9	62	Video Games	300	15%	2,700	9,215
				TOTAL	15%	2,700	9,215

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO .:

FILE:

BLDG:

ZONE:

1406-011

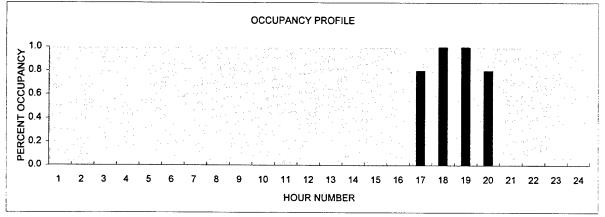
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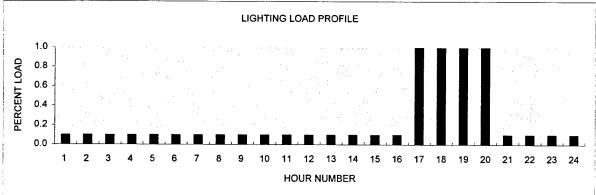
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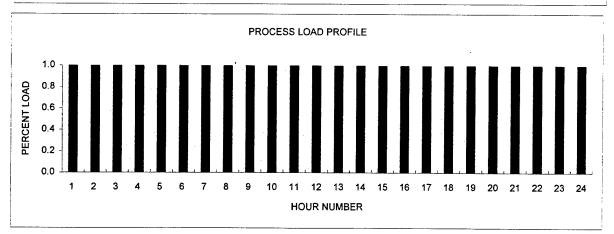
CHECKED BY:

639Z2 639 2

BLDG	BLDG	TYPE OF		HOUR NUMBER																						
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
4	Post Exchan	OCCUPANC	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.0	1.0	0.8	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1
		PROCESS	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0







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BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
                                                             1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME mo
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1)
                                       37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 34650.820000
FLOOR AREA (SQFT) 3706.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 325000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -245500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 37060.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 358.000000
INFILTRATION PROFILE

    .930
    .930
    .930
    .930
    .930

    .930
    .930
    .930
    .930
    .930

    1.00
    1.00
    1.00
    .930
    .930

                                                                                .930
                                                                                .930
                                                                                 .930 .930
A FACTOR IN INFILTRATION EQUATION (CINA) 6.200000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 9170.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 158.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 67.00000
WINDOW GLASS NUMBER (NG) 30
                                       67.000000
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                            WALL DATA
                                            1 2 3 4
.00 90.00 180.00 -90.00

      WALL NUMBER
      1
      2
      3
      4

      AZIMUTH ANGLE (AZ)
      .00
      90.00
      180.00
      -90.00

      WALL AREA SQFT (AWLL)
      207.0
      542.0
      851.0
      994.0

      WINDOW AREA SQFT (AWND)
      .0
      .0
      .0
      107.0

      WINDOW HEIGHT FT (WNDH)
      10.0
      10.0
      10.0
      10.0

      WINDOW WIDTH FT (WNDW)
      .0
      .0
      .0
      10.7

      WIDTH OF OVERHANG (WOH)
      .0
      .0
      .0
      .0

      OVERHANG HGT ABV WNDW (HOH)
      .0
      .0
      .0
      .0
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
WALL TRANSFER FUNCTIONS CN FACTORS NUMBER OF BN FACTORS (NB BN FACTORS BN (BN)	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00003	.00003	.00003	.00003
N=2			.00283	
N=3	.01017	.01017	.01017 .00498	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	*****	*****	******	*****
NUMBER OF DN FACTORS (ND)			5	
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
			-1.50943	
N=3	.65654	.65654	.65654 07415 .00212	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=6	*****	******	*****	*****
ROOT AREA DOTT (AROT) 4011	. 000000			
ROOF U VALUE BTU/HR-SQFT-F (UR)	z\ 3 ⊑Λ	00000 00		
ROOF O VALUE BIO/RR-SQFI-F (UK)	2.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF TRANS FUNCTIONS USED (1=Y) ROOF C TRANSFER FUNCTION (CNR)	ES, 0=NO) 1.8615	(IROOF)	1	
ROOF TRANS FUNCTIONS USED (1=YROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR)	ES, 0=NO) 1.8615	(IROOF) 19E-04		
ROOF TRANS FUNCTIONS USED (1=YROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04	ES, 0=NO) 1.8615 .849E-04	(IROOF) 19E-04		
ROOF TRANS FUNCTIONS USED (1=YROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR)	ES, 0=NO) 1.8615 .849E-04	(IROOF) 19E-04 .635E-04	.120E-04	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36	ES, 0=NO) 1.8615 .849E-04	(IROOF) 19E-04 .635E-04 .534E-01	.120E-04	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT)	ES, 0=NO) 1.8615 .849E-04 410 0.000000	(IROOF) 19E-04 .635E-04 .534E-01 E+00	.120E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES	ES, 0=NO) 1.8615 .849E-04 410 0.000000 (AZSK)	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000	.120E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0	ES, 0=NO) 1.8615 .849E-04 410 0.000000 (AZSK)	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000	.120E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.000	ES, 0=NO) 1.8615 .849E-04 410 0.000000 (AZSK)	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000	.120E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC)	ES, 0=NO) 1.8615 .849E-04 410 0.000000 (AZSK) 000000E+00 00000E+00 DW) 0.0	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000	.120E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC) OVERHANG HEIGHT ABOVE SKYLIGHT	ES, 0=NO) 1.8615 .849E-04 410 0.000000 (AZSK) 00000E+00 00000E+00 DW) 0.0 FT (SKOH)	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000	.120E-04 250E-02	
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.00 SKYLIGHT WIDTH FT (SKW) 0.000 SKYLIGHT OVERHANG WIDTH FT (SKC) OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS)	ES, 0=NO) 1.8615 .849E-04 410 0.000000 (AZSK) 00000E+00 00000E+00 DW) 0.0 FT (SKOH)	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000 00000E+00 0.0000	.120E-04 250E-02 000	
ROOF TRANS FUNCTIONS USED (1=Y) ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	ES, 0=NO) 1.8615 1.849E-04 1.410 0.000000 (AZSK) 00000E+00 00000E+00 DW) 0.0 FT (SKOH) 1	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000 00000E+00 0.0000	.120E-04 250E-02 000 00E+00	
ROOF TRANS FUNCTIONS USED (1=Y) ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	ES, 0=NO) 1.8615 1.849E-04 1.410 0.000000 (AZSK) 00000E+00 00000E+00 DW) 0.0 FT (SKOH) 1	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000 00000E+00 0.0000	.120E-04 250E-02 000 00E+00	1
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SUMMER	ES, 0=NO) 1.8615 .849E-04410 0.000000 (AZSK) 000000E+00 00000E+00 DW) 0.0 FT (SKOH) 1 SHSK (MST HSK (MND,N	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .000000E+0 ,NDST) DND)	.120E-04 250E-02 000 00E+00	1
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SKY LIGHT AREA SQFT (ASKY)	ES, 0=NO) 1.8615 .849E-04410 0.000000 (AZSK) 000000E+00 0000 000 FT (SKOH) 1 SHSK (MST HSK (MND,N) 0.000000E+	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .00000E+0 ,NDST) DND)	.120E-04 250E-02 000 00E+00	1
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SKY LIGHT AREA SQFT (ASKY) DAYTIME SKY LIGHT U BTU/SQFT-HE	ES, 0=NO) 1.8615 1.8615 2.849E-04 3.6410 0.000000 (AZSK) 000000E+00 00000E+00 DW) 0.0 FT (SKOH) 1 SHSK (MND,N 0.000000E+ R-F (SKYU)	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .00000E+0 ,NDST) DND) 00 1.	.120E-04250E-02 000 00E+00 0	1
ROOF TRANS FUNCTIONS USED (1=YIROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR) .000 .172E-05 .257E-04 ROOF D TRANSFER FUNCTIONS (DNR) 1.00 -1.97 1.36 SKYLIGHT TILT DEGREES (TILT) SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKC OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SKY LIGHT AREA SQFT (ASKY)	ES, 0=NO) 1.8615 1.8615 2.849E-04 3.6410 0.000000 (AZSK) 000000E+00 00000E+00 DW) 0.0 FT (SKOH) 1 SHSK (MND,N 0.000000E+ R-F (SKYU)	(IROOF) 19E-04 .635E-04 .534E-01 E+00 9999.000 00000E+00 0.0000 .00000E+0 ,NDST) DND) 00 1.	.120E-04250E-02 000 00E+00 0	1

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	2216.	8620.	9820.		
HOUR	HO	URLY FRAC	TION OF PEA	AK		
1	.100	.012	.000	.000	70.0	76.0
2	.100	.012	.000	.000	70.0	76.0
3	.100	.012	.000	.000	70.0	76.0
4	.100	.012	.000	.000	70.0	76.0
5	.100	.012	.000	.000	70.0	76.0
6	.100	.012	.000	.000	70.0	76.0
7	.100	.012	.000	.000	70.0	76.0
8	.100	.012	.000	.000	70.0	76.0

9	.100	.012	.000	.000	70.0	76.0)
10	.100	.012	.000	.000	70.0	76.0)
11	.100	.012	.000	.000	70.0	76.0)
12	.100	.012	.000	.000	70.0	76.0)
13	.100	.012	.000	.000	70.0	76.0)
14	.100	.012	.000	.000	70.0	76.0)
15	.100	.012	.000	.000	70.0	76.0)
16	.100	.012	.000	.000	70.0	76.0)
17	1.000	.600	.600	.600	70.0	76.0)
18	1.000	.900	1.000	1.000	70.0	76.0)
19	1.000	.900	1.000	1.000	70.0	76.0)
20	1.000	.600	.500	.500	70.0	76.0)
21	.100	.012	.000	.000	70.0	76.0)
22	.100	.012	.000	.000	70.0	76.0	
23	.100	.012	.000	.000	70.0	76.0)
24	.100	.012	.000	.000	70.0	76.0)
NO HEATI	NG ABOVE AMB	ENT TEMP.	OF (THLK	OT) 65	.000000		
NO COOLI	NG BELOW AMB	IENT TEMP.	OF (TCLK	OT) 60	.000000		
	YPE, (IECN)		=				
	IR CFM (SACF)						
ECONOMIZ	ER HIGH TEMP	LIMIT F	65.0	00000			•
SYSTEM S	UPPLY AIR STA	ART TIME H	IR 0.00	0000E+00			
SYSTEM S	UPPLY AIR STO	OP TIME HE	24	.000000			
	IIXED AIR TEM			00000			
	IDE AIR FRAC			1.0000	00E-01		
	CIENCY (EFAN)		000E-01				
	L PRESSURE II						
	PLANT RATED						
	PLANT RATED					•	
	PLANT PART LO					400	451
.100	.191	.200	.286	.300	.369	.400 .800	.451 .812
.500	.537	.600	.625	.700	.718	.800	.012
.900	.906	1.00	1.00				
	TYPE (ITYPCH)		3 (CELOT)	245500.000	2000		
	PLANT RATED						
	PLANT PART LO						
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				. 505
.000	.000		, , , , ,				

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

				PARTIT	IN				
		SOLAR		DOOR	•			VENT	1
		THRU		AND				AND	
H LOAD						WALL	WINDO	W INFL	LATENT
.00	GAIN	1.35	.00	.00	.00	.01	.00	.00	.00
-60.64	LOSS		73	-5.94	.00	-13.76	-1.48	-49.07	.00
		1.84			.00	.03	.00	.00	.00
-48.64	LOSS		60	-5.02	.00	-10.29	-1.26	-41.50	.00
.58	GAIN	2.30	.00	.00	.00	.55	.00	.02	.14
-40.65	LOSS		53	-4.64					.00
		2.42			.00	1.92	.01	.25	. 90
-18.34	LOSS		29	-2.67	.00	-3.77	67	-21.09	.00
11.78	GAIN	2.71	.03	.11	.00	3.82	.03	.73	3.96
-5.06	LOSS		13	-1.44					.00
30.77	GAIN	2.74	.06	.29	.00	5.57	.07	1.94	16.67
46	LOSS		04	68					
44.80	GAIN	2.83	.12	.70	.00	7.25	.17	4.78	23.34
14	LOSS		02	42					.00
40.89	GAIN	2.44	.09	.53	.00	5.89	.13	3.51	22.93
37	LOSS		03	48	.00	18			.00
21.58	GAIN	2.10	.03	.28	.00	3.32	.07	1.95	11.79
-4.96	LOSS		12	-1.19	.00	-1.33	29	-8.90	.00
		1.66	.00	.05	.00	.90	.01	.35	1.47
-16.79	LOSS		31	-2.52	.00	-4.24	61	-18.80	.00
		1.24	.00	.00	.00	.18	.00	.02	.16
			47	-3.76	.00	-7.96	92	-29.07	.00
		1.10							.00
-59.27	LOSS		73	-5.84	.00	-13.96	-1.44	-47.53	.00
		25.							
-288.	LOSS		-4.	-35.	0.	-65.	-9.	-275.	0.
HEATING	LOAD=	-2010)37. F	BTUH ON F	DEC 18	HOUR 7	ΔME	ייםיי יינאקד:	MP -1.
COOLING	LOAD=	1822	271. E	BTUH ON J	TUL 28	HOUR 18	AME	IENT TEN	MP 90.
	.00 -60.64 .00 -48.64 .58 -40.65 4.14 -18.34 11.78 -5.06 30.77 46 44.80 14 40.89 37 21.58 -4.96 3.72 -16.79 .45 -32.30 .00 -59.27 159. -288.	.00 GAIN -60.64 LOSS .00 GAIN -48.64 LOSS .58 GAIN -40.65 LOSS 4.14 GAIN -18.34 LOSS 11.78 GAIN -5.06 LOSS 30.77 GAIN46 LOSS 44.80 GAIN14 LOSS 40.89 GAIN14 LOSS 21.58 GAIN -3.7 LOSS 21.58 GAIN -4.96 LOSS 3.72 GAIN -4.96 LOSS 3.72 GAIN -4.96 LOSS 3.72 GAIN -16.79 LOSS .45 GAIN -32.30 LOSS .90 GAIN -59.27 LOSS 159. GAIN -288. LOSS	THRU WINDOW .00 GAIN -60.64 LOSS .00 GAIN -48.64 LOSS .58 GAIN -40.65 LOSS 4.14 GAIN -18.34 LOSS 11.78 GAIN -5.06 LOSS 30.77 GAIN -5.06 LOSS 44.80 GAIN -44.60 LOSS 40.89 GAIN -14 LOSS 21.58 GAIN -37 LOSS 21.58 GAIN -4.96 LOSS 3.72 GAIN -4.96 LOSS 3.72 GAIN -4.96 LOSS .45 GAIN -16.79 LOSS .45 GAIN -10SS .45 GAIN -10SS	THRU H LOAD .00 GAIN -60.64 LOSS .00 GAIN -48.64 LOSS .58 GAIN -40.65 LOSS 4.14 GAIN -18.34 LOSS .11.78 GAIN -5.06 LOSS .13 30.77 GAIN -46 LOSS 44.80 GAIN -14 LOSS .14 LOSS .15 GAIN -14 LOSS .15 GAIN -14 LOSS .10 COSS .11 COSS .12 .15 GAIN -14 LOSS .10 COSS .11 COSS .11 COSS .12 .15 GAIN -10 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COSS .10 COSS .11 COSS .12 COSS .13 COSS .14 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COSS .11 COSS .12 COSS .13 COSS .14 COSS .15 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COSS .11 COSS .12 COSS .12 COSS .13 COSS .14 COSS .15 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COSS .11 COSS .12 COSS .13 COSS .14 COSS .15 COSS .17 COSS .17 COSS .18 COSS .19 COSS .10 COSS .11 COSS .12 COSS .13 COSS .14 COSS .15 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COSS .10 COSS .11 COSS .12 COSS .13 COSS .14 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COSS .10 COSS .11 COSS .12 COSS .13 COSS .14 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COSS .10 COSS .10 COSS .11 COSS .12 COSS .12 COSS .13 COSS .14 COSS .15 COSS .15 COSS .17 COSS .18 COSS .19 COSS .10 COS	THRU ROOF SLAB .00 GAIN 1.35 .00 .00 -60.64 LOSS73 -5.94 .00 GAIN 1.84 .00 .00 -48.64 LOSS60 -5.02 .58 GAIN 2.30 .00 .00 -40.65 LOSS53 -4.64 4.14 GAIN 2.42 .00 .04 -18.34 LOSS29 -2.67 11.78 GAIN 2.71 .03 .11 -5.06 LOSS13 -1.44 30.77 GAIN 2.74 .06 .2946 LOSS0468 44.80 GAIN 2.83 .12 .7014 LOSS0242 40.89 GAIN 2.83 .12 .7014 LOSS0242 40.89 GAIN 2.44 .09 .5337 LOSS0348 21.58 GAIN 2.10 .03 .28 -4.96 LOSS12 -1.19 3.72 GAIN 1.66 .00 .05 -16.79 LOSS31 -2.52 .45 GAIN 1.24 .00 .00 -32.30 LOSS47 -3.76 .00 GAIN 1.10 .00 .00 -59.27 LOSS73 -5.84 159. GAIN 25. 0. 2288. LOSS -435.	H LOAD WINDOW ROOF SLAB BSMT .00 GAIN 1.35 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	H LOAD WINDOW ROOF SLAB BSMT WALL .00 GAIN 1.35 .00 .00 .00 .01 -60.64 LOSS73 -5.94 .00 -13.76 .00 GAIN 1.84 .00 .00 .00 .03 -48.64 LOSS60 -5.02 .00 -10.29 .58 GAIN 2.30 .00 .00 .00 .55 -40.65 LOSS53 -4.64 .00 -8.12 4.14 GAIN 2.42 .00 .04 .00 1.92 -18.34 LOSS29 -2.67 .00 -3.77 11.78 GAIN 2.71 .03 .11 .00 3.82 -5.06 LOSS13 -1.44 .00 -1.27 30.77 GAIN 2.74 .06 .29 .00 5.57 -46 LOSS04 -68 .0029 44.80 GAIN 2.83 .12 .70 .00 7.25 -14 LOSS04 -68 .0029 44.80 GAIN 2.83 .12 .70 .00 7.25 -14 LOSS02 -42 .0013 40.89 GAIN 2.44 .09 .53 .00 5.89 -37 LOSS03 -48 .0018 21.58 GAIN 2.40 .09 .53 .00 5.89 -37 LOSS03 -48 .00 -18 21.58 GAIN 2.10 .03 .28 .00 3.32 -4.96 LOSS12 -1.19 .00 -1.33 3.72 GAIN 1.66 .00 .05 .00 .90 -16.79 LOSS31 -2.52 .00 -4.24 .45 GAIN 1.24 .00 .00 .00 .90 -16.79 LOSS31 -2.52 .00 -7.96 .00 GAIN 1.10 .00 .00 .00 .00 .7.96 -32.30 LOSS73 -5.84 .00 -13.96 .59.27 LOSS73 -5.84 .00 -13.96 .59.27 LOSS73 -5.84 .00 -13.96	THRU MINDOW ROOF SLAB BSMT WALL WINDOW -00 GAIN 1.35 .00 .00 .00 .01 .00 .00 .01 .00 .00 .00	H LOAD THRU WINDOW ROOF SLAB BSMT WALL WINDOW INFI .00 GAIN .00 GAIN .00 GAIN .00 .00 .00 .00 .00 .00 .00 .

ZONE UA BTU/HR-F 909.3

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

								FAN TOTAL			
INTERNAL COIN- LIGHTING PROCESS HEAT HEAT GA											
INTERNAL SPACE TEMPERATURE F						CIDENT	THOUSAND		MILLION		
MONTH						AMBT.	KWH	BTU	BTU	BTU	
JAN	70.	76.	69.	4 29		58. 14.	1.72	.50	1.95	8.97	
1											
FEB	70.	76.	69.	9 2		63. 14.	1.57	.45	1.76	8.16	
MAR	70.	77.		10			1.74	.50	1.95	9.05	
			69.	4	6	15.					
APR	72.	77.		7 9			1.69	.49	1.89	8.78	
			69.	9	6	30.					
MAY	73.	7 7.	70.			79. 39.	1.72	.50	1.95	8.97	
JUN	75.	77.	70.	30 4			1.69	.49	1.89	8.78	
JUL	76.	78.		15	18	92.	1.74	.50	1.95	9.05	
-		,	69.			67.					
AUG	76.	77.		12			1.72	.50	1.95	8.97	
			70.	25	6	51.					
SEP	74.	77.	70.	2 15			1.71	.49	1.89	8.85	
OCT	72.	77.	69.				1.72	.50	1.95	8.97	
NOV	70	77.		17	19	59.	1.67	.48	1.89	8.70	
NOV	70.	,,.	68.				1.07	. 40	1.05	0	
DEC	70.	77.		29		55.	1.76	.51	1.95	9.12	
			69.	18	. 7	-1.				·	
YEAR							20.42	5.92	22.97	106.36	

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF H	OURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WERE	NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OLING	HEATING	COOLING
JAN	734	0	0	0 -	1863E+06	.0000
FEB	634	4	0	0	1566E+06	.0000
MAR	637	38	0	0 .	1560E+06	.7819E+05
APR	442	133	0	0	9899E+05	.8852E+05
MAY	250	251	0	0	6871E+05	.1148E+06
JUN	40	418	0	0	2261E+05	.1666E+06
JUL	18	562	0	0	1974E+05	.1823E+06
AUG	31	533	0	0	3176E+05	.1693E+06
SEP	173	313	0	0	6532E+05	.1609E+06
OCT	434	104	0	0	9143E+05	.9620E+05
NOV	585	30	0	0	1330E+06	.5511E+05
DEC	720	4	0	0	2010E+06	.0000
YEAR	4698	2390	0	0	2010E+06	.1823E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	ION PROCESS MILLION BTU	TANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	99.82	.00	1.72	.50	.57	8.97	12.4
FEB	82.00	.00	1.57	.45	.52	8.16	12.4
MAR	74.41	.07	1.74	.50	.57	9.05	20.6
APR	42.44	.48	1.69	.49	.55	8.78	21.4
MAY	20.45	1.31	1.72	.50	.57	8.97	23.4
JUN	3.14	3.21	1.69	.49	.55	8.78	26.8
JUL	1.41	4.58	1.74	.50	.57	9.05	27.7
AUG	2.44	4.24	1.72	.50	.57	8.97	27.0
SEP	14.54	2.25	1.71	.49	.55	8.85	26.5
OCT	39.99	.42	1.72	.50	.57	8.97	20.8
NOV	63.75	.05	1.67	.48	.55	8.70	15.4
DEC	97.15	.00	1.76	.51	.57	9.12	12.4
YEAR	541.55	16.60	20.42	5.92	6.73	106.36	27.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 188017. BTU/(SQFT-YEAR)

BLDG 639 - Post Exchange - Store/ Snack Bar - Zone 1 BASELINE

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.								
	HORIZ.	HORIZ.					HOUR	S WHEN	MUMIXAM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/		AMBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1863E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	1566E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.7819E+05	1560E+06
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.8852E+05	9899E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1148E+06	6871E+05
NUL	2647.	1993.	1.000	72.	0.	0.	0	0	.1666E+06	2261E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.1823E+06	1974E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.1693E+06	3176E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.1609E+06	6532E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.9620E+05	9143E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.5511E+05	1330E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2010E+06

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BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                               37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                  56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 34650.820000
FLOOR AREA (SQFT) 3706.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 325000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -245500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 37060.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 358.000000
INFILTRATION PROFILE
 .930 .930
                                                                 .930
                                                                            .930
                                                                 .930
                                                                              .930
A FACTOR IN INFILTRATION EQUATION (CINA) 6.200000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 9170.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 158.900000
PARTITION UA BTU/HR-F (GUA) · 0.000000E+00
DOOR UA BTU/HR-F (DUA) 67.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                   WALL DATA
WALL DATA

WALL NUMBER

1 2 3 4

AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00

WALL AREA SQFT (AWLL) 207.0 542.0 851.0 994.0

WINDOW AREA SQFT (AWND) .0 .0 .0 107.0

WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0

WINDOW WIDTH FT (WNDW) .0 .0 .0 .0 10.7

WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0

OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0
                                                                   -90.00
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MAX SOLAR WITH NO SHADE (SOLMX)				
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176		.00176	
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND) DN FACTORS	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
NUMBER OF DN FACTORS (ND) DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6 POOF APEA SOFT (AROF) 4011				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728	.00728
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 4011	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.8615	19E-04		
ROOF B TRANSFER FUNCTIONS (BNR)			
.000 .172E-05 .257E-04	.849E-04	.635E-04	.120E-04	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	0000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO	0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SE	SHSK (MST	, NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	ASK (MND, N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-HENIGHT TIME SKYLIGHT U BTU/SQFT-	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	4.9000001	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS SE	NSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	2216.	8620.	9820.		
HOUR	HC	URLY FRACTI	ON OF PEA	AK		
1	.100	.012	.000	.000	70.0	76.0
2	.100	.012	.000	.000	70.0	76.0
3	.100	.012	.000	.000	70.0	76.0
4	.100	.012	.000	.000	70.0	76.0
5	.100	.012	.000	.000	70.0	76.0
6	.100	.012	.000	.000	70.0	76.0
7	.100	.012	.000	.000	70.0	76.0
8	.100	.012	.000	.000	70.0	76.0

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76.0
                  .012
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                                               70.0
          .100
                 .012
.012
 23
                                            70.0
                                                        76.0
          .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                        60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 6000.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR
                              0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 58.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 330000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 412500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                   .400
                                                            .451
      .191 .200 .286 .300 .369
.100
                                           .718
                                                              .812
                                   .700
                                                    .800
.500
         .537
                  .600
                          .625
                1.00 1.00
                         1.00
         .906
 .900
CHILLER TYPE (ITYPCH)
COOLING PLANT RATED OUTPUT BTU (CFLOT) 245500.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 64704.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
     .000 .000 .000 .000
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BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITI DOOR AND				VENT AND	
MNT	H LOAD			ROOF	SLAB	BSMT	WALL	WINDO		
JAN	.00	GAIN	1.35	.00						.00
	-50.49	LOSS		73	-5.94	.00			-49.10	.00
FEB	.00	GAIN	1.84	.00	.00	.00	.00	.00	.00	.00
	-41.08	LOSS		60	-5.03		-2.69			.00
MAR	.45	GAIN	2.30	.00	.00	.00	.03	.00	.01	.11
	-34.72	LOSS		53	-4.63	.00	-1.99	-1.16	-37.48	.00
APR	3.21	GAIN	2.42	.00	.03	.00	.28	.01	.22	.86
	-15.76	LOSS		29	-2.65		81		-20.73	.00
MAY	9.67	GAIN	2.71	.03	.10	.00	.80	.03	.67	3.79
	-4.51	LOSS		12	-1.40		12		-9.92	.00
JUN	26.15	GAIN	2.74	.06	.28	.00	1.40	.07	1.90	15.57
	47	LOSS		04	63	.00	.00	15	-4.28	.00
JUL		GAIN	2.83		.70	.00		.17	4.78	21.53
	14	LOSS		02	40	.00	.00	10	-2.76	.00
AUG			2.44	.09		.00		.13	3.50	21.09
	34	LOSS		03	46	.00	.00	11	-3.04	.00
cen	18.95	CATA	2 20	0.0						
SEP		LOSS	2.10	12	.27		.74	.07		11.16
	-4.20	TO22		12	-1.17	.00	19	29	-8.65	.00
ОСТ	3.28	GATN	1.66	0.0	.04	0.0	.12	0.1	.30	1 42
	-13.81		1.00		-2.51		98		-18.64	1.43
	13.01	1000		51	-2.51	.00	50	61	-18.64	.00
NOV	.38	GAIN	1.24	.00	.00	0.0	.01	0.0	.01	.16
	-26.50				-3.76		-2.02		-29.06	.00
					3.70		2.02	. , , ,	-25.00	.00
DEC	.00	GAIN	1.10	.00	.00	. 0.0	.00	0.0	.00	.00
	-49.02	LOSS			-5.85	.00			- 4 7.59	.00
							5.05	1.11	47.33	.00
TOT	135.	GAIN	25.	0.	2.	0.	7.	0.	13	76.
	-241.				-34.					0.
						- •		- •		٠.
MAX	HEATING	LOAD=	-1698	339. B	TUH ON D	EC 18	HOUR 7	AMB	IENT TEM	IP -1.
MAX	COOLING	LOAD=	1618	381. B	TUH ON J	UL 28	HOUR 18	AMB	IENT TEM	IP 90.

ZONE UA BTU/HR-F 439.7

BEACON Energy Analysis By EMC Engineers, Inc. 639AFG.I

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

									FAN TO	OTAL
INTERN		DNTAT.	SPACE			OIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
			URE F			IDENT	THOUSAND		MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR A	MBT.	KWH	BTU	BTU	BTU
77.17	70.	76.		4	20	58.	1.72	.50	1.95	8.97
JAN	70.	70.	69.		6	4.	1.72	.50		
FEB	70.	76.		13	20	59.	1.57	.45	1.76	8.16
			69.	2	7	14.				
MAR	70.	77.		10	19	63.	1.74	.50	1.95	9.05
			69.	4	6	15.				
APR	72.	77.		29	18	75.	1.69	.49	1.89	8.78
APR	12.	,,.	70.			30.	2.07			
MAY	73.	77.			18 4	80. 38.	1.72	.50	1.95	8.97
			70.	7.1	4	30.				
JUN	75.	77.		30	18	85.	1.69	.49	1.89	8.78
			70.	18	4	57.				
JUL	76.	77.		15	18	92.	1.74	.50	1.95	9.05
ООД	,	,,,	70.			66.				
							. 50	F.0	1 05	8.97
AUG	76.	77.	70.	12 25		84. 51.	1.72	.50	1.95	8.97
			70.	2.5	Ū	51.				
SEP	74.	77.		2		83.	1.71	.49	1.89	8.85
			70.	15	6	39.				
OCT	72.	77.		14	19	71.	1.72	.50	1.95	8.97
4 4 4			70.	24	5	66.				
						E 0	1.67	.48	1.89	8.70
NOV	71.	77.	69.	17 8		59. 66.	1.0/	.40	1.00	0.70
			55.	J	,					
DEC	70.	77.				54.	1.76	.51	1.95	9.12
			69.	18	7	-1.				
YEAR							20.42	5.92	22.97	106.36

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	E NOT MET	вт	J
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
JAN	733	0	0	0	1609E+06	.0000
FEB	635	3	0	0	1320E+06	.0000
MAR	640	28	0	0	1335E+06	.7118E+05
APR	448	123	0	0	8248E+05	.7503E+05
MAY	264	228	0	0	5824E+05	.9925E+05
JUN	49	379	0	0	1938E+05	.1512E+06
JUL	22	513	0	0	1665E+05	.1619E+06
AUG	31	483	0	0	2705E+05	.1525E+06
SEP	168	292	0	0	5470E+05	.1450E+06
OCT	431	98	0	0	7879E+05	.8407E+05
NOV	577	30	0	0	1116E+06	.4857E+05
DEC	718	5	0	0	1698E+06	.0000
YEAR	4716	2182	0	0	1698E+06	.1619E+06

BEACON Energy Analysis By EMC Engineers, Inc.

639AFG.I

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TANS FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	89.45	.00	1.72	.50	.57	8.97	12.4
FEB	74.46	.00	1.57	.45	.52	8.16	12.4
MAR	68.62	.05	1.74	.50	.57	9.05	20.0
APR	40.50	.38	1.69	.49	.55	8.78	20.3
MAY	21.26	1.10	1.72	.50	.57	8.97	22.3
JUN	3.85	2.78	1.69	.49	.55	8.78	25.8
JUL	1.73	3.95	1.74	.50	.57	9.05	26.5
AUG	2.44	3.68	1.72	.50	.57	8.97	25.9
SEP	13.68	2.01	1.71	.49	.55	8.85	25.4
OCT	37.43	.38	1.72	.50	.57	8.97	20.0
NOV	57.86	.05	1.67	.48	.55	8.70	14.8
DEC	86.46	.00	1.76	.51	.57	9.12	12.4
YEAR	497.75	14.37	20.42	5.92	6.73	106.36	26.5

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 174148. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 639AFG.I

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
:	HORIZ.	HORIZ.					HOUR	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/	7	MBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	1609E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	1320E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.7118E+05	1335E+06
7.00	0010	1.00								
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.7503E+05	8248E+05
MAY	2566.	1826.	1.000	65	0	_		_		
I-TA-T	2566.	1020.	1.000	65.	0.	0.	0	0	.9925E+05	5824E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	1 E 1 2 E . 0 C	10207.05
001.	2017.	1000.	1.000	12.	0.	0.	U	U	.1512E+06	1938E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	1619F±06	1665E+05
					••	٠.	Ŭ	Ü	.10175700	1005E+05
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.1525E+06	2705E+05
										12,002.03
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.1450E+06	5470E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.8407E+05	7879E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.4857E+05	1116E+06
DEC	002	C04	1 000	2.5	•	_		_		
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	1698E+06

.0 .0

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BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
                                               1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 34650.820000
FLOOR AREA (SOFT) 3706.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 325000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -245500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 37060.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 358.000000
INFILTRATION PROFILE
 .930 .930 .930
                              .930 .930 .930 .930
                                                                        .930
          .930 .930 .930 .930 .930
1.00 1.00 1.00 .930 .930
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 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 6.200000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 9170.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 158.900000
PARTITION UA BTU/HR-F (GUA) . 0.000000E+00
DOOR UA BTU/HR-F (DUA) 67.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                  WALL DATA
                                  1 2
                                                      3
WALL NUMBER
                                                              -90.00
                                             90.00
                                                      180.00
AZIMUTH ANGLE (AZ)
                                   .00
                                207.0 542.0 851.0
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND) .0 .0 .0 .0 .0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) .0 .0 .0 .0 .0 .0 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0
                                                              107.0
                                                                10.0
                                                                 10.7
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MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.055	.055	.055	.055
	00174	00174	.00174	00174
NUMBER OF BN FACTORS (NB	.001/4	.001/4	5	.00174
BN FACTORS BN (BN)	3	j.	5)
N=1	00000	00000	00000	00000
N=2	00000	00000	.00000 .00019	00000
N=3	00089	00019	00019	00019
N=4	00059	00059	00059	00059
N=5	.00007	.00055	00007	00000
N=1 N=2 N=3 N=4 N=5 N=6	*****	*****	******	******
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				•
DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 4011	.000000			
ROOF U VALUE BTU/HR-SQFT-F (URI				
ROOF TRANS FUNCTIONS USED (1=YF				
ROOF C TRANSFER FUNCTION (CNR)	1.8615	19E-04		
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .172E-05 .257E-04		.635E-04	.120E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.97 1.36 -	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.0				
SKYLIGHT WIDTH FT (SKW) 0.00 SKYLIGHT OVERHANG WIDTH FT (SKO		0000000.00		
OVERHANG HEIGHT ABOVE SKYLIGHT			005.00	
SKYLIGHT GLASS NUMBER (NS)	1 (SKOH)	0.0000	005+00	
SKYLIGHT SHADING COEFFICIENT (S		.000000E+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SH	ISK (MND, N	DND)		1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SOFT-HE	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-				
FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	4.9000001	E-01

-----INTERNAL GAINS AND PROFILES ------

THERMOSTAT SET POINT DEG F

	KW -		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	2216.	8620.	9820.		
HOUR	HC	URLY FRACT	ION OF PEA	4K		
1	.100	.012	.000	.000	70.0	76.0
2	.100	.012	.000	.000	70.0	76.0
3	.100	.012	.000	.000	70.0	76.0
4	.100	.012	.000	.000	70.0	76.0
5	.100	.012	.000	.000	70.0	76.0
6	.100	.012	.000	.000	70.0	76.0
7	.100	.012	.000	.000	70.0	76.0
8	.100	.012	.000	.000	70.0	76.0

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 23
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                                          70.0
          .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 6000.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
                            24.000000
SYSTEM SUPPLY AIR STOP TIME HR
SYSTEM MIXED AIR TEMP(TMXAIR) 58.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 330000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 412500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
.100 .191 .200 .286 .300 .369
                                                        .451
                                                 .400
                                                          .812
                                 .700
                                                 .800
                                         .718
        .537
                 .600
                         .625
.500
      .906 1.00
                         1.00
 .900
                      3
CHILLER TYPE (ITYPCH)
COOLING PLANT RATED OUTPUT BTU (CFLOT) 245500.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 64704.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000
                                                 .000
                                                          .000
                                        .000
                                                 .000
        .000
        .000
                .000
                         .000
 .000
```

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

JAN	H LOAD	GAIN		.00		BSMT	.00	.00	.00	LATENT
	-49.93	LOSS		73	-5.94	.00	-3.00	-1.48	-49.10	.00
FEB	.00 -40.66	GAIN LOSS	1.84		.00 -5.03		.00 -2.26			.00
	.45 -34.43	GAIN LOSS	2.30		.00 -4.63		.03 -1.68		.01 -37.48	.11
APR	3.20 -15.67	GAIN LOSS	2.42		.03 -2.65		.25 69			.86 .00
MAY	9.61 -4.55		2.71		.10 -1.40		.69 11		.67 -9.90	3.77
JUN		GAIN LOSS	2.74	.06 04	.29 63	.00	1.18			15.30
JUL		GAIN LOSS	2.83	.12		.00	- · - ·	.17 10		21.12
AUG		GAIN LOSS	2.44		.53 45	.00	1.28	.13 11	3.50 -3.01	20.95
SEP	18.88 -4.19	GAIN LOSS	2.10	.03 12	.27 -1.17		.63 17	.07 29	1.91 -8.63	11.16
OCT	3.29 -13.69	GAIN LOSS	1.66	.00	.04 -2.51		.10 83		.30 -18.66	1.43
	.39 -26.21		1.24	.00	.00 -3.76		.01 -1.71		.01 -29.08	.16 .00
	.00 -48.46		1.10	.00 73	.00 -5.85		.00 -3.07		.00 -47.60	.00
TOT	133. -239.		25.		2. -34.		6. -14.		13. -273.	75. 0.
MAX MAX	HEATING COOLING	LOAD=	-1686 1613	520. E 325. E	ET NO HUTE	EC 18 JL 28	HOUR 7 HOUR 18	AME AME	SIENT TEM	IP -1. IP 90.

ZONE UA BTU/HR-F 413.5

BEACON Energy Analysis By EMC Engineers, Inc. 639ARGD.I

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

FAN TOTAL INTERNAL LIGHTING PROCESS HEAT GAIN HEAT COIN-INTERNAL SPACE THOUSAND MILLION MILLION MILLION TEMPERATURE F CIDENT BTU BTU BTU KWH MONTH AVG. MAX MIN DAY HR AMBT. 8.97 1.95 20 58. 1.72 .50 JAN 70. 76. 69. 27 6 4. 9 20 63. 1.57 .45 1.76 8.16 FEB 70. 76. 69. 2 7 14. 9.05 1.74 .50 1.95 19 63. MAR 70. 77. 10 70. 6 15. 4 18 75. .49 1.89 8.78 1.69 APR 72. 77. 29 70. 9 5 30. 8.97 MAY 73. 77. 27 18 80. 1.72 .50 1.95 70. 11 38. 8.78 .49 1.89 JUN 30 18 85. 1.69 75. 77. 70. 18 4 57. 1.95 9.05 JUL 76. 77. 15 18 92. 1.74 .50 70. 24 66. 8.97 12 19 84. 1.72 .50 1.95 AUG 76. 77. 70. 25 6 51. 19 83. 1.71 .49 1.89 8.85 SEP 74. 77. 2 6 39. 70. 15 8.97 14 19 71. 1.72 .50 1.95 OCT 72. 77. 70. 24 5 66. 8.70 19 59. 1.67 .48 1.89 NOV 71. 77. 17 69. 7 66.

1.76

20.42

23

18

69.

19 54.

. 7 -1.

DEC

YEAR

70. 77.

.51

5.92

1.95

22.97 106.36

9.12

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	733	0	0	0 -	.1601E+06	.0000
FEB	634	4	0	0 -	.1311E+06	.0000
MAR	639	28	0	0 -	.1327E+06	.7149E+05
APR	448	123	0	0 -	.8207E+05	.7482E+05
MAY	266	227	0	0 -	.5818E+05	.9899E+05
JUN	51	372	0	0 -	.1963E+05	.1508E+06
JUL	22	503	0	0 -	.1692E+05	.1613E+06
AUG	32	480	0	0 -	.2723E+05	.1520E+06
SEP	169	292	0	0 -	.5451E+05	.1445E+06
OCT	430	98	0	0 -	.7839E+05	.8385E+05
NOV	575	31	0	0 -	.1108E+06	.4857E+05
DEC	718	5	0	0 -	.1686E+06	.0000
YEAR	4717	2163	0	0 -	.1686E+06	.1613E+06

BEACON Energy Analysis By EMC Engineers, Inc. 639ARGD.I

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	88.90	.00	1.72	.50	.57	8.97	12.4
FEB	74.00	.00	1.57	.45	.52	8.16	12.4
MAR	68.28	.05	1.74	.50	.57	9.05	20.0
APR	40.42	.38	1.69	.49	.55	8.78	20.3
MAY	21.42	1.09	1.72	.50	.57	8.97	22.2
JUN	4.01	2.73	1.69	.49	. 55	8.78	25.8
JUL	1.73	3.88	1.74	.50	.57	9.05	26.5
AUG	2.51	3.65	1.72	.50	.57	8.97	25.9
SEP	13.76	2.00	1.71	.49	.55	8.85	25.4
OCT	37.29	.38	1.72	.50	.57	8.97	20.0
NOV	57.47	.05	1.67	.48	.55	8.70	14.8
DEC	85.91	.00	1.76	.51	.57	9.12	12.4
YEAR	495.69	14.22	20.42	5.92	6.73	106.36	26.5

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 173447. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 639ARGD.I

BLDG 639 - BRANCH PX STORE (ZONE 1) ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

:	SURF. BTU/	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/		AVG.	MAX SYS	RIFT	SYSTE NOT	S WHEN M LOADS MET	MAXIMUM COOLING LOAD	MAXIMUM HEATING LOAD
MONTH	SQFT- DAY	SQFT- DAY	PF FACTOR	DEG. F	DEG. +	F -	COOL	HEAT	BTU	BTU
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1601E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	1311E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.7149E+05	1327E+06
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.7482E+05	8207E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.9899E+05	5818E+05
JUN	2647.	1993.	1.000	72.	Ο.	0.	0	0	.1508E+06	1963E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.1613E+06	1692E+05
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.1520E+06	2723E+05
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.1445E+06	5451E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.8385E+05	7839E+05
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.4857E+05	1108E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	1686E+06

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BLDG 639 - Post Exchange Game room - Zone 2 BASELINE
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
******REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995
               YEAR 1955
SITE LATITUDE DEG (AL1)
                           37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                          1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 9415.590000
FLOOR AREA (SQFT) 1046.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 44000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -42000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 10460.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 93.000000
INFILTRATION PROFILE
                            .850
                                     .850
 850
      .850 .850
                                                         .850
                                               .850
                                                                    .850
 .850
        .850 .850 .850 .850 .850
1.00 1.00 1.00 .850 .850
                                                          .850
                                                                    .850
1.00
                                                          .850
                                                                    .850
A FACTOR IN INFILTRATION EQUATION (CINA) 5.930000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 5230.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 75.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 19.100000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                         6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
```

	WALL DAT	'A		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	581.0	248.0	. 0	239.0
WINDOW AREA SQFT (AWND)	.0	. 0	.0	27.0
WINDOW HEIGHT FT (WNDH)	.0	. 0	.0	2.7
WINDOW WIDTH FT (WNDW)	. 0	. 0	.0	10.0
WIDTH OF OVERHANG (WOH)	.0	. 0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	. 0	.0	. 0

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	120.0 .113	120.0 .113	120.0 .113	120.0
CN FACTORS	.00416	.00416	.00416	.00416
NUMBER OF BN FACTORS (NB BN FACTORS BN (BN)	5	5		5
N=1	00001	00001	.00001	00001
N=2	.00058	.00058	.00058	.00058
N=3	.00229	00229	.00229	00229
N=4	.00119	00119	00119	00119
N=5	.00009	.00009	00009	00009
N=6.	*****	*****	.00119 .00009	******
NUMBER OF DN FACTORS (ND) DN FACTORS N=1 N=2 N=3	•	2	J	5
N=1	1.00000	1.00000	1 00000	1 00000
N=2	-1.71940	-1.71940	-1 71940	-1 71940
N=3	84375	84375	84375	84375
N=4	- 09022	- 09022	- 09022	- 09022
N=5	00268	00268	00268	00022
N=6	*****	******	.84375 09022 .00268	******
ROOF AREA SQFT (AROF) 1046				
ROOF U VALUE BTU/HR-SQFT-F (URI		0000F-02		
ROOF TRANS FUNCTIONS USED (1=YI			1	
ROOF C TRANSFER FUNCTION (CNR)	1 8615	19E-04	_	
ROOF B TRANSFER FUNCTIONS (BNR)		171 04		
.000 .172E-05 .257E-04		635E-04	120F-04	
ROOF D TRANSFER FUNCTIONS (DNR)		.0335 04	.1201 04	
1.00 -1.97 1.36	- 410	534E-01	- 250E-02	
SKYLIGHT TILT DEGREES (TILT)			.2301 02	
SKYLIGHT AZIMUTH ANGLE DEGREES			0000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO		004300000		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S		.000000E+0	00	
SUMMER START MONTH AND DAY FOR	SHSK (MST	, NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	ISK (MND, N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-HF			292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKY)	JN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPA	CE (FAP)	1.500000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					LOINI	EG I
	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	2.	1382.	2700.	2200.		
HOUR	- HO	OURLY FRAC	TION OF PE	AK		
1	.100	1.000	.000	.000	70.0	76.0
2	.100	1.000	.000	.000	70.0	76.0
3	.100	1.000	.000	.000	70.0	76.0
4	.100	1.000	.000	.000	70.0	76.0
5	.100	1.000	.000	.000	70.0	76.0
6	.100	1.000	.000	.000	70.0	76.0
7	.100	1.000	.000	.000	70.0	76.0
8	.100	1.000	.000	.000	70.0	76.0

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70.0
                                                                 76.0
                   1.000
                                .000
                                         .000
            .100
  9
                                                     70.0
                                                                 76.0
                                          .000
 10
            .100
                     1.000
                                .000
                  1.000
                                                     70.0
                                                                 76.0
                                          .000
                                .000
 11
            .100
                               .000
                                          .000
                                                     70.0
                                                                 76.0
            .100 1.000
  12
                                                                 76.0
                               .000
                                         .000
                                                     70.0
            .100 1.000
  13
                               .000
                                                     70.0
                                                                 76.0
            .100 1.000
                                         .000
                                         .000
                                                                 76.0
                               .000
                                                      70.0
           .100 1.000
 15
                                         .000
                                                      70.0
                                                                 76.0
                               .000
            .100 1.000
 16
                                          .800
                                                      70.0
                                                                 76.0
                               .800
          1.000 1.000
 17
          1.000 1.000 1.000 1.000
                                                      70.0
                                                                 76.0
  18
                                                                 76.0
                                                      70.0
          1.000 1.000 1.000 1.000
  19
                               .800
                                                      70.0
                                                                 76.0
                                         .800
          1.000 1.000
  20
                                                                 76.0
                                                      70.0
            .100 1.000
                                .000
                                          .000
  21
                                .000
                                                      70.0
                                                                 76.0
                                          .000
                    1.000
            .100
  22
                                .000
                                          .000
                                                      70.0
                                                                 76.0
                     1.000
            .100
  23
                    1.000 .000 .000 70.0
                                                                 76.0
             .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000 NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 1000.000000
ECONOMIZER HIGH TEMP LIMIT F 0.000000E+00
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                                  24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
                                  65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 0.000000E+00
FAN EFFICIENCY (EFAN)
                      5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 6.000000E-01

        HEATING
        PLANT
        RATED
        OUTPUT
        BTU
        (HFLOT)
        44000.000000

        HEATING
        PLANT
        RATED
        INPUT
        BTU
        (HFLIN)
        55000.000000

HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                           .400
                                                                     .451
.100 .191 .200 .286 .300 .369
.500 .537 .600 .625
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 3
                                                                       .812
                                                             .800
                                        .700
                                                  .718
COOLING PLANT RATED OUTPUT BTU (CFLOT) 42000.000000 COOLING PLANT RATED INPUT BTU (CFLIN) 10750.000000
                                         42000.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                           .000
 .000
                              .000
                                                  .000
                                                                       .000
          .000
                                                             .000
                    .000
 .000
                   .000
                              .000
         .000
 .000
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BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTI DOO AND	R			VENT AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDO		LATENT
JAN	.00	GAIN	.34	.00	.00	.00	.00	.00	.00	.00
	-9.89	LOSS		19			-2.40	37	-8.12	.00
FEB		GAIN	.46	.00	.00	.00	.01	.00	.00	.00
	-7.75	LOSS		16	-2.12	.00	-1.79	32	-6.89	.00
MAR	.22	GAIN	.57		.00		.10	.00	.00	.05
	-6.11	LOSS		14	-1.97	.00	-1.41	30	-6.19	.00
APR	1.14	GAIN	.60		.02				.04	.23
	-2.20	LOSS		08	-1.18	.00	66	18	-3.45	.00
MAY	2 11	CA TAT	6.77	.01						
MAI	3.11 28	GAIN LOSS	.6/	04	.04 70				.10	.88
	20	1 033		04	/0	.00	22	10	-1.77	.00
JUN	7.49	GAIN	68	.01	.11	.00	.97	0.3	.28	3.42
	.00	LOSS	.00	02	35				84	.00
					.55	.00	.04	.05	04	.00
JUL	10.06	GAIN	.70	.03	.29	.00	1.37	.04	.74	4.28
	.00	LOSS		01	21			03		.00
AUG	9.38	GAIN	.61	.02	.22	.00	1.19	.03	.52	4.29
	.00	LOSS		01	24	.00	02	03	56	.00
SEP	5.52	GAIN	.52		.11		.72	.02	.30	2.58
	30	LOSS		04	56	.00	20	08	-1.50	.00
OOM	1 00	C3 T31	4.0							
OCT	1.20 -1.85	LOSS	.42		.02			.00		.43
	-1.85	LUSS		09	-1.13	.00	72	16	-3.06	.00
NOV	.22	GATN	31	.00	.00	.00	.06	.00	.00	.07
	-4.53			13	-1.62	.00				.00
				,	1.02	.00	1.55			.00
DEC	.00	GAIN	.28	.00	.00	.00	.00	.00	.00	.00
	-9.54	LOSS			-2.46		-2.42			.00
TOT	38.33	GAIN	6.17	.08	.82	.00	5.58	.12	2.04	16.23
	-42.44	LOSS		-1.07	-15.04	.00	-11.23	-2.23	-45.40	.00
									BIENT TEM	
MAX	COOLING	LOAD=	37	174. B	TUH ON	JUL 28	HOUR 18	AME	BIENT TEM	IP 90.

ZONE UA BTU/HR-F 193.1

BEACON Energy Analysis By EMC Engineers, Inc.

639B.I

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

INTERN	7. T								FAN TO	OTAL
INTERN	INTE		SPACE URE F			COIN- CIDENT		PROCESS MILLION		
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	76.	69.	4 29		58. 14.	.46	7.52	.33	3.35
FEB	70.	76.	69.	9 2		63. 14.	.42	6.86	.29	3.06
MAR	71.	79.	69.	12 3		56. 15.	.47	7.60	.33	3.39
APR	73.	79.	69.	14 9		54. 30.	.45	7.38	.31	3.29
MAY	75.	78.	70.				.46	7.52	.33	3.35
JUN	76.	77.	73.			82. 59.	.45	7.38	.31	3.29
JUL	76.	78.	74.			87. 60.	.47	7.60	.33	3.39
AUG	76.	77.	72.			84. 55.	.46	7.52	.33	3.35
SEP	75.	80.	70.	16 15		55. 39.	.46	7.46	.31	3.32
OCT	73.	80.	70.	21 11		57. 36.	.46	7.52	.33	3.35
NOV	71.	80.	69.	17 3		56. 18.	.45	7.30	.31	3.25
DEC	70.	79.	69.		, 20 7	55. -1.	.47	7.69	.33	3.42
YEAR							5.47	89.35	3.83	39.82

BEACON Energy Analysis By EMC Engineers, Inc.

639B.I

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER O	F HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS W	ERE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	690	0	0	0	3358E+05	.0000
FEB	592	0	0	0	2846E+05	.0000
MAR	536	25	0	0	2837E+05	.1816E+05
APR	288	133	0	0	1704E+05	.2112E+05
YAM	71	319	0	0	1056E+05	.2555E+05
JUN	0	596	0	0	.0000	.3455E+05
JUL	0	680	0	. 0	.0000	.3717E+05
AUG	0	677	0	0	.0000	.3510E+05
SEP	70	419	0	0	-9221.	.3548E+05
OCT	294	137	0	0	1441E+05	.2132E+05
NOV	454	29	0	0	2252E+05	.1413E+05
DEC	679	0	0	0	3678E+05	.0000
YEAR	3674	3015	0	0	3678E+05	.3717E+05

SYSTEM TOTALS

		ENERG		OTAL INTERNAL			
	HEATING MILLION	COOLING THOUSAND	LIGHTING THOUSAND	PROCESS MILLION	FANS THOUSAND	HEAT GAIN MILLION	ELECTRIC DEMAND
MONTH		KWH	KWH	BTU	KWH	BTU	KW
JAN	14.91	.00	.46	7.52	.10	3.35	3.2
FEB	12.01	.00	.42	6.86	.09	3.06	3.2
MAR	9.94	.02	.47	7.60	.10	3.39	5.0
APR	4.26	.12	.45	7.38	.09	3.29	5.2
MAY	.84	.32	.46	7.52	.10	3.35	5.5
JUN	.00	.75	.45	7.38	.09	3.29	6.0
JUL	.00	.97	.47	7.60	.10	3.39	6.1
AUG	.00	.92	.46	7.52	.10	3.35	6.0
SEP	.82	.55	.46	7.46	.09	3.32	6.0
OCT	3.94	.13	.46	7.52	.10	3.35	5.1
NOV	7.78	.02	.45	7.30	.09	3.25	4.4
DEC	14.45	.00	.47	7.69	.10	3.42	3.2
YEAR	68.94	3.81	5.47	89.35	1.12	39.82	6.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 185266. BTU/(SQFT-YEAR)

BLDG 639 - Post Exchange Game room - Zone 2 BASELINE

OTHER MONTHLY STATISTICS

(CLEAR									
	DAY SOLAR	ACTUAL SOLAR								
	INSOL.	INSOL.								
		HORIZ.					HOUR	S WHEN	MUMIXAM	MUMIXAM
	SURF.	SURF.		AVG.	MAX SYS	rem	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/	7	MBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	3358E+05
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2846E+05
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1816E+05	2837E+05
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2112E+05	1704E+05
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.2555E+05	1056E+05
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.3455E+05	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.3717E+05	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3510E+05	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.3548E+05	-9221.
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.2132E+05	1441E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1413E+05	2252E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	3678E+05

```
BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL FIBERGLASS INSUL.
----- PROGRAM CONTROL OPTIONS ------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
                                                  1
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME MO
STATION 13995 YEAR 1955
                               37.750000
SITE LATITUDE DEG (AL1)
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 9415.590000
FLOOR AREA (SQFT) 1046.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 44000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -42000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 10460.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 93.000000
INFILTRATION PROFILE
 .850 .850 .850 .850 .850 .850
.850 .850 .850 .850 .850 .850
1.00 1.00 1.00 1.00 .850 .850
                                                                     .850
                                                                      .850
.850
                                                                                 .850
                                                                                   .850
A FACTOR IN INFILTRATION EQUATION (CINA) 5.930000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 5230.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 75.900000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 19.100000
DOOR UA BTU/HR-F (DUA) 19.10000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
 WINDOW SHADING FACTOR (SHD) 5.900000E-01
MALL DATA

1

ALIMUTH ANGLE (AZ) .00

WALL AREA SQFT (AWLL) 581.0 2

WINDOW AREA SQFT (AWND) .0

WINDOW HEIGHT FT (WNDH)

WINDOW WIDTH FT (WNDW)

WINDOW WIDTH CO
                                       WALL DATA
                                                              3
                                                  90.00 180.00 -90.00
WALL AREA SQFT (AWLL) 581.0 248.0 .0 239.0 WINDOW AREA SQFT (AWND) .0 .0 .0 .0 27.0 WINDOW HEIGHT FT (WNDH) .0 .0 .0 .0 .0 2.7 WINDOW WIDTH FT (WNDW) .0 .0 .0 .0 10.0 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW(HOH) .0 .0 .0 .0 .0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)				
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				-
N=1	.00000	.00000	- 00000	.00000
N=2	.00016	.00016	00016	00016
		.00086		
N=5	00008	.00066 .00008 *****	00000	00000
N=6	******	******	******	******
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS	O	O	0	0
	1 00000	1.00000	1 00000	1 00000
N=1 N=2 N=3 N=4 N=5	-1 71064	-1 71064	-1 71064	1.00000
N=3	99735	90735	-1./1064	-1./1064
N=4	100133	16643	.89/35	.89/35
N=5	16643	16643	16643	16643
N=6	.00728	16643 .00728 00002	.00/28	.00728
DOOR ADEA CORM (ADOD)	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 1046				
ROOF U VALUE BTU/HR-SQFT-F (URI	3.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YI	is, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR)		19E-04		
.000 .172E-05 .257E-04	849E-04	635E-04	120F-04	
ROOF D TRANSFER FUNCTIONS (DNR)		.0001	.1205 01	
1.00 -1.97 1.36		534E-01	- 250E-02	
SKYLIGHT TILT DEGREES (TILT)			.2302 02	
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.0				
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO		00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT			00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SH				1
SKY LIGHT AREA SOFT (ASKY)	0.00000E+	0.0		_
DAYTIME SKY LIGHT U BTU/SOFT-HE	R-F (SKYU)	1.3	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	1.5000001	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					POINT D	EG F
	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	2.	1382.	2700.	2200.		
HOUR	HO	OURLY FRAC	TION OF PE	AK		
1	.100	1.000	.000	.000	70.0	76.0
2	.100	1.000	.000	.000	70.0	76.0
3	.100	1.000	.000	.000	70.0	76.0
4	.100	1.000	.000	.000	70.0	76.0
5	.100	1.000	.000	.000	70.0	76.0
6	.100	1.000	.000	.000	70.0	76.0
7	.100	1.000	.000	.000	70.0	76.0
8	.100	1.000	.000	.000	70.0	76.0

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70.0
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                                                                76.0
  23
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                     1.000
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                                .000
                                          .000
                                                  70.0
                                                                76.0
            .100
                     1.000
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 1000.000000
ECONOMIZER HIGH TEMP LIMIT F 0.000000E+00
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 0.000000E+00
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 44000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 55000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
.100 .191 .200 .286 .300 .369
.500 .537 .600 .625 .700 .718
                                                          .400 .451
                .600 .625
1.00 1.00
YPCH) 3
                                                           .800
                                                                      .812
       .906
.900
CHILLER TYPE (ITYPCH)
                              3
COOLING PLANT RATED OUTPUT BTU (CFLOT) 42000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 10750.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                        .000 .000 .000 .000
.000 .000 .000
.000 .000 .000 .000 .000
         .000 .000 .000
.000 .000
 .000
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ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITI DOOR AND	N			VENT AND	
MNT	I LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	.00	GAIN	.34	.00	.00	.00	.00	.00	.00	.00
	-8.85	LOSS		19	-2.50	.00	-1.35	37	-8.13	.00
FEB	.00	GAIN	.46	.00		.00			.00	.00
	-6.98	LOSS		16	-2.12	.00	-1.01	32	-6.89	.00
MAR		GAIN	.57	.00	.00	.00			.00	.05
	-5.51	LOSS		14	-1.97	.00	75	30	-6.18	.00
APR	1.04	GAIN	.60	.00	.01	.00	.13	.00		.23
	-1.96	LOSS		08	-1.17	.00	32	18	-3.44	.00
MAY	2.89	GAIN	.67	.01	.04	.00	.29	.01	.10	.85
	24	LOSS		04	70	.00	07	10	-1.76	.00
JUN	7.05	GAIN	.68	.01	.11	.00	.53	.02	.28	3.37
	.00	LOSS		02	35	.00	.00	05	83	.00
JUL	9.44	GAIN	.70	.03	.29	.00	.76	.04	.74	4.25
	.00	LOSS		01	21	.00	.00	03	51	.00
AUG	8.85	GAIN	.61	.02		.00	.67		.52	4.26
	.00	LOSS		01	23	.00	.00	03	56	.00
SEP	5.25	GAIN	.52	.01			.37	.02		2.57
	26	LOSS		04	56	.00	07	08	-1.50	.00
OCT	1.15	GAIN	.42	.00		.00		.00	.05	.43
	-1.58	LOSS		09	-1.13	.00	36	17	-3.06	.00
NOV	.20	GAIN	.31	.00			.01		.00	.07
	-3.98	LOSS		13	-1.62	.00	73	24	-4.72	.00
DEC	.00	GAIN	.28	.00	.00		.00	.00	.00	.00
	-8.50	LOSS		19	-2.47	.00	-1.37	36	-7.81	.00
TOT	36.09	GAIN	6.17	.08	.81	.00	2.85		2.03	16.09
	-37.86	LOSS		-1.07	-15.04	.00	-6.04	-2.23	-45.38	.00
MAX	HEATING	LOAD=	-33	3240. 1	BTUH ON 1	DEC 18	HOUR 7	AMB	IENT TEM	IP -1.
	COOLING						HOUR 18			

ZONE UA BTU/HR-F 140.8

BEACON Energy Analysis By EMC Engineers, Inc.

FAN TOTAL

639BFG.I

INTERN	INTE		SPACE URE F			COIN-	LIGHTING THOUSAND		HEAT MILLION	HEAT GAIN MILLION
MONTH					HR A	AMBT.	KWH	BTU	BTU	BTU
JAN		76.		4	20	58. 11.	.46	7.52	.33	3.35
FEB	70.	76.	69.	9 6		63. 14.	.42	6.86	.29	3.06
MAR	71.	78.	69.	12 4		56. 15.	.47	7.60	.33	3.39
APR	73.	79.	70.				.45	7.38	.31	3.29
MAY	75.	78.	70.	22 11			.46	7.52	.33	3.35
JUN	76.	77.	73.	_		82. 59.	.45	7.38	.31	3.29
JUL	76.	77.	73.			87. 60.	.47	7.60	.33	3.39
AUG	76.	77.	72.	11 25		84. 55.	.46	7.52	.33	3.35
SEP	75.	80.	70.			55. 39.	.46	7.46	.31	3.32
OCT	73.	80.	70.				.46	7.52	.33	3.35
NOV	71.	80.	69.				.45	7.30	.31	3.25
DEC	70.	79.	69.	23 18		55. -1.	.47	7.69	.33	3.42
YEAR							5.47	89.35	3.83	39.82

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
JAN	680	0	0	0	30007.05	0000
		-	-	0	3099E+05	.0000
FEB	587	0	0	0	2581E+05	.0000
MAR	530	26	0	0	2587E+05	.1730E+05
APR	282	126	0	0	1505E+05	.1992E+05
MAY	62	300	0	0	-9618.	.2408E+05
JUN	0	579	0	0	.0000	.3321E+05
\mathtt{JUL}	0	670	0	0	.0000	.3523E+05
AUG	0	668	0	0	.0000	.3344E+05
SEP	66	416	0	0	-8306.	.3357E+05
OCT	277	133	0	0	1328E+05	.1980E+05
NOV	440	29	0	0	2032E+05	.1341E+05
DEC	670	0	0	0	3324E+05	.0000
YEAR	3594	2947	0	0	3324E+05	.3523E+05

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	13.75	.00	.46	7.52	.10	3.35	3.2
FEB	11.19	.00	.42	6.86	.09	3.06	3.2
MAR	9.27	.02	.47	7.60	.10	3.39	4.9
APR	3.97	.11	.45	7.38	.09	3.29	5.1
MAY	.73	.30	.46	7.52	.10	3.35	5.4
JUN	.00	.71	.45	7.38	.09	3.29	5.9
JUL	.00	. 93	.47	7.60	.10	3.39	6.0
AUG	.00	.88	.46	7.52	.10	3.35	5.9
SEP	.75	.53	.46	7.46	.09	3.32	5.9
OCT	3.56	.12	.46	7.52	.10	3.35	5.1
NOV	7.12	.02	.45	7.30	.09	3.25	4.4
DEC	13.29	.00	.47	7.69	.10	3.42	3.2
YEAR	63.63	3.62	5.47	89.35	1.12	39.82	6.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 179580. BTU/(SQFT-YEAR)

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ.	ACTUAL SOLAR INSOL. HORIZ.					HOUR	s when	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	ΓΕΜ		M LOADS	COOLING	HEATING
	BTU/	BTU/		AMBT.	TEMP. DI			MET	LOAD	LOAD
MONTH!	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	3099E+05
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2581E+05
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1730E+05	2587E+05
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1992E+05	1505E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.2408E+05	-9618.
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.3321E+05	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.3523E+05	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3344E+05	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.3357E+05	-8306.
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1980E+05	1328E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1341E+05	2032E+05
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	3324E+05

```
BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION
----- PROGRAM CONTROL OPTIONS ------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.375000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995
                  YEAR 1955
                                  37.750000
SITE LATITUDE DEG (AL1)
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                      56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 9415.590000
FLOOR AREA (SQFT) 1046.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 44000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -42000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 10460.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 93.000000
INFILTRATION PROFILE
                                                                                  .850
 .850
                                                                       .850
                                                                                    .850
                                                            .850
                                                                       .850
                                                                        .850
                                                                                    .850
A FACTOR IN INFILTRATION EQUATION (CINA) 5.930000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 5230.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 75.900000
PARTITION UA BTU/HR-F (GUA) · 0.000000E+00
DOOR UA BTU/HR-F (DUA) 19.100000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                        WALL DATA
                                       1 2 3 4

      WALL NUMBER
      1
      2
      3
      4

      AZIMUTH ANGLE (AZ)
      .00
      90.00
      180.00
      -90.00

      WALL AREA SQFT (AWLL)
      581.0
      248.0
      .0
      239.0

      WINDOW AREA SQFT (AWND)
      .0
      .0
      .0
      27.0

      WINDOW HEIGHT FT (WNDH)
      .0
      .0
      .0
      2.7

      WINDOW WIDTH FT (WNDW)
      .0
      .0
      .0
      10.0

      WIDTH OF OVERHANG (WOH)
      .0
      .0
      .0
      .0

      OVERHANG HGT ABV WNDW (HOH)
      .0
      .0
      .0
      .0

WALL NUMBER
                                                                         -90.00
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0					
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055					
WALL TRANSFER FUNCTIONS									
CN FACTORS	.00174	.00174	.00174	.00174					
NUMBER OF BN FACTORS (NB	5	5	5	5					
BN FACTORS BN (BN)									
N=1	.00000	.00000	.00000	.00000					
N=2	.00019	.00019	.00019	.00019					
N=3	.00089	.00089	.00089	.00089					
N=4	.00059	.00059	.00059	.00059					
N=5	.00007	.00007	.00007	.00007					
N=1 N=2 N=3 N=4 N=5	*****	*****	*****	*****					
NUMBER OF DN FACTORS (ND)	6	6	6	6					
DN FACTORS									
N=1	1.00000	1.00000	1.00000	1.00000					
N=2	-1.66125	-1.66125	-1.66125	-1.66125					
N=3	.83196	.83196	.83196	.83196					
N=4	14508	14508	14508	14508					
N=5	.00613	.00613	.00613	.00613					
N=6	00002	00002	00002	00002					
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 1046	.000000								
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.50	0000E-02							
ROOF TRANS FUNCTIONS USED (1=Y			1						
ROOF C TRANSFER FUNCTION (CNR)			_						
ROOF B TRANSFER FUNCTIONS (BNR)								
.000 .172E-05 .257E-04		.635E-04	.120E-04						
ROOF D TRANSFER FUNCTIONS (DNR									
1.00 -1.97 1.36	410	.534E-01	250E-02						
SKYLIGHT TILT DEGREES (TILT)									
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000						
SKYLIGHT HEIGHT FT (SKH) 0.									
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00								
SKYLIGHT OVERHANG WIDTH FT (SK									
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00						
SKYLIGHT GLASS NUMBER (NS)									
SKYLIGHT SHADING COEFFICIENT (.000000E+0	0						
SUMMER START MONTH AND DAY FOR	SHSK (MST	,NDST)	1	1					
SUMMER END MONTH AND DAY FOR SHSK (MND.NDND) 1 1									
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00							
DAYTIME SKY LIGHT U BTU/SOFT-H	DAYTIME SKY LIGHT U BTU/SOFT-HR-F (SKYU) 1.292998								
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998						
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	1.500000	E-01					

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	2.	1382.	2700.	2200.		
HOUR	HO	OURLY FRAC	CTION OF PE	AK		
1	.100	1.000	.000	.000	70.0	76.0
2	.100	1.000	.000	.000	70.0	76.0
3	.100	1.000	.000	.000	70.0	76.0
4	.100	1.000	.000	.000	70.0	76.0
5	.100	1.000	.000	.000	70.0	76.0
6	.100	1.000	.000	.000	70.0	76.0
7	.100	1.000	.000	.000	70.0	76.0
8	.100	1.000	.000	.000	70.0	76.0

```
.100 1.000
.100 1.000
.100 1.000
                                                  70.0
                                                             76.0
                           .000
                                      .000
  9
                                       .000
                                                             76.0
                             .000
                                                 70.0
 10
                             .000
                                       .000
                                                  70.0
                                                             76.0
 11
                                       .000
                                                  70.0
                                                             76.0
                             .000
           .100 1.000
 12
                                       .000
                                                  70.0
                                                             76.0
            .100 1.000
                             .000
 13
                                       .000
                                                   70.0
                                                             76.0
           .100 1.000
                             .000
 14
                                       .000
                             .000
                                                   70.0
                                                             76.0
           .100 1.000
 15
                             .000
                                       .000
                                                   70.0
                                                             76.0
           .100 1.000
 16
         1.000 1.000 .800 .800
1.000 1.000 1.000 1.000
                                                             76.0
                                                   70.0
 17
                                                             76.0
                                                  70.0
 18
                                                  70.0
                                                             76.0
         1.000 1.000 1.000 1.000
 19
                                                             76.0
                            .800
                                                  70.0
         1.000 1.000
                                      .800
 20
                              .000
                                                  70.0
                                                             76.0
           .100 1.000
                                       .000
 21
                              .000
                                                             76.0
            .100 1.000
                                                  70.0
                                       .000
 22
            .100 1.000 .000 .000 70.0
.100 1.000 .000 .000 70.0
                                                            76.0
 23
                                                             76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 1000.000000
ECONOMIZER HIGH TEMP LIMIT F 0.000000E+00
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
                                24.000000
SYSTEM SUPPLY AIR STOP TIME HR
SYSTEM MIXED AIR TEMP (TMXAIR) 65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 0.000000E+00
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 6.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 44000.0000000 HEATING PLANT RATED INPUT BTU (HFLIN) 55000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                       .400
.100 .191 .200 .286 .300 .369
                                                                 .451
                                      .700
                                               .718
                                                        .800
               .600
1.00
                                                                  .812
 .500
       .537
.906
                            .625
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 3
COOLING PLANT RATED OUTPUT BTU (CFLOT)
                                      42000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 10750.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000 .000 .000 .000 .000 .000
.000 .000 .000 .000 .000 .000
.000 .000 .000
                                                                 .000
```

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PART	ITN				
			SOLAR		DOC	OR			VEN	т
			THRU		ANI				AND	
	TH LOAD		WINDOW	ROOF	SLAE	BSM'	r WALL	WINDO		
JAN	.00		.34	.00	.00	.00	.00	.00	.00	
	-8.66	LOSS		19	-2.50				-8.13	
									0.15	.00
FEB			.46	.00	.00	.00	.00	.00	.00	.00
	-6.84	LOSS		16	-2.12				-6.89	
MAR	.21		.57	.00	.00	.00	.02	.00	.00	.05
	-5.42	LOSS		14	-1.97	.00	65	30	-6.19	.00
APR	1.04	GAIN	.60	.00	.01	.00	.12	.00	.04	.23
	-1.93	LOSS		08	-1.17	.00	28			.00
MAY		GAIN	.67			.00	.26	.01	.10	.85
	24	LOSS		04	70	.00	06	10	-1.76	.00
TINI										
JUN		GAIN	.68	.01	.11		.45	.02	.28	3.34
	.00	LOSS		02	35	.00	.00	05	83	.00
JUL	9.32	O2 717								
COL	.00	GAIN	.70	.03	.29			.04		4.23
	.00	LOSS		01	21	.00	.00	03	51	.00
AUG	8.73	GAIN	.61	00	2.2	•				
	.00	LOSS	.01	.02 01	.22 23			.03	.53	4.23
	•••	2000		01	23	.00	.00	03	55	.00
SEP	5.20	GAIN	.52	.01	.11	.00	.32	.02	2.0	0.56
	26			04	56	.00		08		2.56 .00
						.00	.07	00	-1.50	.00
OCT	1.14	GAIN	.42	.00	.02	.00	.07	.00	.05	.43
	-1.54	LOSS		09	-1.13	.00		17		.00
										.00
NOV	.21		.31	.00	.00	.00	.01	.00	.00	.07
	-3.90	LOSS		13	-1.63		63		-4.72	.00
DEC		GAIN	.28	.00	.00	.00	.00	.00	.00	.00
	-8.31	LOSS		19	-2.47	.00	-1.17		-7.82	.00
	35.65		6.17			.00	2.48	.12	2.03	15.99
	-37.10	LOSS		-1.07	-15.04	.00	-5.22	-2.23	-45.40	.00
										-
MAV	tieametic	1025								
	HEATING		-328	331. B1	TUH ON	DEC 18	HOUR 7			
ILITAY	COOLING	LOAD≃	350)29. BI	ruh on	JUL 28	HOUR 18	AMB	IENT TEN	1P 90.

ZONE UA BTU/HR-F 131.2

BEACON Energy Analysis By EMC Engineers, Inc. 639BRGD.I

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

	FAN	TOTAL
TERNAL.		

INTERN	AL									
	INTE	RNAL	SPACE			COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
	TEM!	PERAT	URE F			CIDENT	THOUSAND		MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	76.		4	20	58.	.46	7.52	.33	3.35
			69.	29	4	11.				
FEB	70.	76.		13			.42 .	6.86	.29	3.06
			69.	6	7	14.				
						F. 6	4.5	7.60	2.2	3.39
MAR	71.	78.					.47	7.60	.33	3.39
			69.	3	ь	15.				
APR	73	79.		14	20	54.	.45	7.38	.31	3.29
Ark	,,,	,,,	70.				. 15	,.50		0.12
			,	_	Ū	50.				
MAY	75.	78.		22	20	54.	.46	7.52	.33	3.35
			70.							
JUN	76.	77.		30	19	82.	.45	7.38	.31	3.29
			72.	19	6	59.				
JUL	76.	77.				87.	.47	7.60	.33	3.39
			73.	10	6	60.				
7.170	7.0				1.0	84.	.46	7.52	.33	3.35
AUG	76.	77.	72.	11 25		55.	.40	7.52	. 3 3	3.33
			12.	25	,	55.				
SEP	75.	80.		16	20	55.	.46	7.46	.31	3.32
			70.		6					
OCT	73.	80.		21	20	57.	.46	7.52	.33	3.35
			70.	19	7	33.				
NOV	71.	80.		17		56.	.45	7.30	.31	3.25
			69.	3	7	18.				
222		 .		•	•		4.77	7 60	2.2	2 42
DEC	70.	79.		23 18			.47	7.69	.33	3.42
			69.	18	. 7	-1.				
YEAR							5 47	89.35	3.83	39.82
TUMK							3.71	07.55	5.05	37.02

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	Ţ
MONTH	HEATING	ECONOMIZER	HEATING C	COOLING	HEATING	COOLING
JAN	678	0	0	0	3071E+05	.0000
FEB	586	0	0	0	2553E+05	.0000
MAR	529	26	0	0	2561E+05	.1755E+05
APR	281	127	0	0	1492E+05	.1985E+05
MAY	62	295	0	0	-9600.	.2401E+05
JUN	0	568	0	0	.0000	.3306E+05
JUL	0	663	0	0	.0000	.3503E+05
AUG	0	662	0	0	.0000	.3327E+05
SEP	65	414	0	0	-8259.	.3340E+05
OCT	273	133	0	0	1316E+05	.1971E+05
NOV	436	29	0	0	2007E+05	.1340E+05
DEC	667	0	0	0	3283E+05	.0000
YEAR	3577	2917	0	0	3283E+05	.3503E+05

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PION PROCESS MILLION BTU	TANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	13.55	.00	.46	7.52	.10	3.35	3.2
FEB	11.05	.00	.42	6.86	.09	3.06	3.2
MAR	9.17	.02	.47	7.60	.10	3.39	4.9
APR	3.93	.11	.45	7.38	.09	3.29	5.1
MAY	.73	.30	.46	7.52	.10	3.35	5.4
JUN	.00	.70	.45	7.38	.09	3.29	5.9
JUL	.00	.91	.47	7.60	.10	3.39	6.0
AUG	.00	.87	.46	7.52	.10	3.35	5.9
SEP	.74	.52	.46	7.46	.09	3.32	5.9
OCT	3.50	.12	.46	7.52	.10	3.35	5.1
NOV	7.01	.02	.45	7.30	.09	3.25	4.4
DEC	13.07	.00	.47	7.69	.10	3.42	3.2
YEAR	62.75	3.58	5.47	89.35	1.12	39.82	6.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 178601. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 639BRGD.I

BLDG 639 - BRANCH PX GAME ROOM (ZONE 2) ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	3071E+05
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2553E+05
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1755E+05	2561E+05
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.1985E+05	1492E+05
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.2401E+05	-9600.
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.3306E+05	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.3503E+05	.0000
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.3327E+05	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.3340E+05	-8259.
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1971E+05	1316E+05
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.1340E+05	2007E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	3283E+05

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORM	IATION:						
Building No:	639	Building Name	e: Post Exchange				
Surveyed by:	DMS	Date:	11/7/95	Building Use	: Food & Clothi	ng Outlet	
Building Contact:				Phone No:			
Building Contact:		· · · · · · · · · · · · · · · · · · ·		Phone No:			
OCCUPANCY:							
Number of Employee	es: Mon.:		Schedule) :	То		
	TuesSat.	: 3		1700	То	2000	
	Sun.	3		1300	То	1930	
Visitors Per Day:	Mon.:		Schedule):	То		
	TuesSat.:	50		1700	То	2000	
	Sun.	50		1300	То	1930	_
Comments:							
LIGHTING SCHEDU	LE:						·
Normal Occupancy:	Mon.:		Schedule	:	То		
	TuesSat.:	·		1700	То	2000	
	Sun.:			1300	То	1930	
EQUIPMENT SCHE	OULE:						
Fan/AHU Schedule:	MonFri.:		Schedule	: 0	То	2400	
	Sat./Sun.:			0	То	2400	
Chiller Schedule:	MonFri.:		Schedule	: 0	То	2400	
•	Sat./Sun.:			0	То	2400	
Boiler Schedule:	MonFri.:		Schedule		То		
	Sat./Sun.:	,	-		To		
Aux. Equipment Sche	dule:						
Domestic HW	MonFri.:		Schedule	0	То	2400	
and the second s	Sat./Sun.:			0	То	2400	-
	MonFri.:		Schedule		То	1	
	Sat./Sun.:				То		
Comments:							

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

Building No 639

Building Name: Post Exchange

EMC No. 1406-011

Date: 2/18/96 Prepared by: DMS

BUILDING ENVELOPE

	EVIE	RIOR WALLS	L	IST OF EXT. WALL CONSTRUCTION TYPES
Wall Direction (N, E, W, or S)	Wall Construction No.	Comments	Wall Construction No.	Description
N	XW-1		XW-I	Face Brick & CMU
Е	XW-2		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-2		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-1		XW-4	Face Brick, CMU, & Plaster Coat
			XW-5	Insulated Metal Panel
	w	INDOWS		LIST OF WINDOW TYPES
Window	Window	IIIDONO		FIST OF MINDOM (11-52
Direction (N, E, W, or S)	Construction No.	Comments	Window Construction No.	Description
W	W-1		W-1	Double Pane Clear
			W-2	Double Pane Tinted
			W-3	Single Pane with Storm Windows
			W-4	Single Pane
	ROOF CO	DNSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
	Roof			
Roof	Construction	0	Roof Construction	
Location	No.	Comments	No.	Description
Game Room		,	R-I	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
ALL	R-2		R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceilir Tile
Store Area			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
ALL	R-2		R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plast Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceilin Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaste Clg.
	 		ji l	

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 639

Building Name: Post Exchange

EMCNo. 1406-011

Prepared by: DMS

Date: 2/18/96

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INTE	RIOR EQUIP	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall					
Direction (N,	ltom No	Nia af Itama	Comments	ltem No.	Description
E, W, or S)	Item No.	No. of Items	Comments	item no.	Architectural
				A-1	Interior Partitions
Store Area	4.0		Clothing shelves on North side 25' long, by	A-2	Wall Placards
S	A-6	1		A-3	Drapery Valances
S	F-2	1	8' high	A-4	Drapery Rods
				A-5	Hair Dryer
E	A-5	1		A-6	Shelves
E	E-2	1		-	Jierres
E	E-5	1			
E	M-1	1		 	
w	A-6	2	Storage shelves in supply room 30' long by		
W	L-3	1	8' high		Plumbing
W	E-3	1		P-1	Sinks
				P-2	Commodes
Gameroom				P-3	Toilet Stalls
Е	E-3	1		P-4	Water Fountains
Е	F-1	1		_	HYAC Mechanical
			1/2" piping for unit heaters	M-1	Floor Supply/Return Grilles
N	E-2	4	1/2 piping for unit nearers	M-2	Ceiling Supply/Return Grilles
N	M-5	2		M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
W	E-2	5	E, S, W, walls covered with wood paneling	M-5	Fan Coil Unit
			3'-0" A.F.F.	1 11-7	
		<u></u>	3-0 A.F.F.	-	Electrical
					Electrical Panels
		<u> </u>		E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Wall Mounted Television
				E-5	Electric Hand Dryer
					Lighting
				L-1	Wall Mounted Fixtures
				L-1	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
				-	Communication
	,	-		C-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
	 			(-3	Telephone Jacks
	<u> </u>				
	ļ			-11	

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 744

Building Name: Post Exchange

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INT	ERIOR EQUIP	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
			Same as Bldg 639 except for the following:	A-I	Interior Partitions
				A-2	Wall Placards
W			Phone Center alone west wall, includes	A-3	Drapery Valances
			8 phone booths	A-4	Drapery Rods
				A-5	Hair Dryer
				A-6	Shelves
				P-1	Plumbing Sinks
				P-2	Commodes
				P-3	Toilet Stalls
				P-4	Water Fountains
				[- 	water Lonitain?
					HVAC Mechanical
				M-I	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Fan Coil Unit
					Electrical
				E-I	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Wall Mounted Television
				E-5	Electric Hand Dryer
			•		Lighting
				L-I	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fine Production
				F-1	Fire Protection Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-2	Sprinkler Heads
				F-4	Fire Extinguishers
				1-1	ine evenigations
					Communication
				C-I	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				(-3	Telephone Jacks
					A STATE OF THE STA

E M C Engineers, Inc.
Project Name: Limited Energy Study, Insulating Brick Buildings
Location: Fort Leonard Wood, Missouri

E M C No. 1406-011 Date: 2/29/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORMA	1026		Building Name:	Post Excha	ange	-,-			
	DMS		Date:	11/6/95	- J-	Building Use:	Food & Clothing	g Outlet	
Surveyed by: I Building Contact:	CIVIC		Date.	1170100		Phone No:			
Building Contact:						Phone No:			
OCCUPANCY:									
Number of Employee	es: Mon		6		Schedule:	730	То	1300	
Author of Employed		Wed.:	6			730	То	1900	
		sFri.	6			730	То	2000	
		Sun.	6			1200	То	1900	
Fritare Des Dess	Mon		65		Schedule:	730	То	1300	
Visitors Per Day:		 sWed.:	65			730	То	1900	
		svveu sFri.	65			730	То	2000	
		SFII. /Sun.	65			1200	То	1900	
	Sat.i	Juli.							
Comments:									
LIGHTING SCHEDI	JLE:							4200	
Normal Occupancy:	Mon	ı. :			Schedule:	730	To	1300	
	Tue	sWed.:				730	To	1900	
		rsFri.				730	To	2000 1900	
	Sat.	/Sun.				1200	То	1900	
EQUIPMENT SCHE								2400	
Fan/AHU Schedule:		ıFri.:			Schedule:	0	To	2400	
		/Sun.:				0	То	2400	
Chiller Schedule:		nFri.:			Schedule:	0	To	2400	
		/Sun.:				0	To	24 UU	
		nFri.:			Schedule:		То		
	Sat	./Sun.:					То		
Aux. Equipment Sc	hedule:							0400	
Domestic HW	Mo	nFri.:			Schedule:	0	To	2400	
	Sat	./Sun.:				0	To	2400	
	Mo	nFri.:			Schedule:		To		
	Sat	./Sun.:					То		
Comments:									

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

Building No 1026 Building Name: Post Exchange

E M C No. 1406-011

Date: 2/29/96 Prepared by: DMS

BUILDING ENVELOPE

		EXTERIOR WALLS		IST OF EXT. WALL CONSTRUCTION TYPES
Wall	Wall			
Direction (N	, Construction		Wall Construction	
E, W, or S)	No.	Comments	No.	Description
N	XW-5		XW-I	Face Brick & CMU
E	XW-5		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-5		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-5		XW-4	Face Brick, CMU, & Plaster Coat
			XW-5	Face Brick, 2.5" Rigid Insul., and CMU with Loose-Fill Insu Cores
		WINDOWS		LIST OF WINDOW TYPES
Window Direction (N	Window			
E, W, or S)	Construction No.	Comments	Window	.
S S	W-2	Comments	Construction No.	Description
	W-2 W-2		W-I	Double Pane Clear
**	VV-Z		W-2	Double Pane Tinted
			W-3	Single Pane with Storm Windows
			W-4	Single Pane
	RC	OF CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
	Roof			
Roof	Construction		Roof Construction	
Location	No.	Comments	No.	Description
Ali	R-5		R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
			R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceili Tile
			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
			R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plast Clg.
			R-5	One-Ply Ballast Roofing, 4" Rigid Insul., Metal Roof Deck, A Space, and Ceiling Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaste Clg.
			R-7	Metal Deck, I" Rigid Insulation, 6" Batt, Ceiling Tile

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 1026

Building Name: Post Exchange

E M C No. 1406-011

Prepared by: DMS

Date: 2/29/96

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

			PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall Direction (N, E, W, or S)	Item No	No. of Items	Comments	Item No.	Description
E, W, O 3)	item ivo.	TVO. OF ILCTIO			Architectural
	54			-	Interior Partitions
Ň	P-1	1		A-2	Wall Placards
N	E-2	3			Drapery Valances
N	L-3	1	FOL of elething shelves	A-4	Drapery Rods
N	A-6	1	50' of clothing shelves	A-5	Hair Dryer
N	A-8	1	<u> </u>	A-6	Shelves
				A-7	Mirror
		<u> </u>		A-7 A-8	Peg Board Wall
Ε	E-2	2		A-0 A-9	Cabinets
E	C-1	1		A-Y	Cabinets
E	A-5	1	Tile on toilet wall - from floor to ceiling		Diambing
Ε	P-3	2			Plumbing
				P-I	Sinks
				P-2	Commodes
S	E-2	3		P-3	Toilet Stalls
S	A-5	3	Wood paneling 3' high and 30' long	P-4	Water Fountains
S	P-1	2			UVAC Markarian
S	A-9	1	10' long cabinets in Barber Shop		HVAC Mechanical
				M-1	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
W	F-4	1	Tile on toilet wall - 6' up from floor	M-3	Finned-Tube Baseboard Radiators
- W	F-2	2		M-4	Thermostats / Space Temp. Sensors
W	L-3	1		M-5	Fan Coil Unit
W	E-4	2	·		
W	E-2	1			Electrical
	P-5	6		E-I	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Wall Mounted Television
				E-5	Electric Hand Dryer
					Lighting
	 			L-I	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
	 		/		
	<u> </u>				Fire Protection
		 		F-I	Alarm Pull Switches
	ļ	- 		F-2	Alarm Sound Devices (Speakers, Bells)
	 	-		F-3	Sprinkler Heads
	 			F-4	Fire Extinguishes
		 			
	 	 			Communication
				(-I	Telephones - Wall Mounted
	 	 		C-2	Telephones - Booth Mounted
				- C-3	Telephone Jacks
	<u> </u>				1- 4
L,	<u></u> _	<u> </u>			

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

DATE:

EMC NO.: 1406-011 Feb-96

PREPARED BY:

DMS

CHECKED BY:

AJN

	BLDG:	639	FILE:	639AH1
	AIR HANDLING UNIT	SURVEY OBSE	RVATIONS	
AHU-1	AHU NO.		MECH. RM.	LOCATION (RM)
ACCU-1	REF. SYS. SERVING AHU	STORE/ SNACK	BAR	SERVES AREA

	***************************************		UNIT TYP	E:		
	SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	H&V	
X	MULTIZONE	DOUBLE DT	REHEAT	INDUCTION	VAV	
3	NUMBER OF ZONES	3	OTHER			
	COMMENT: PNEU	JMATIC ACTUATORS				

					NAMEPL	ATE:				
OUNHAM-	BUSH				MFG.		N2-64-1			MODEL
3.0	SUPPLY FAN HP		DAYTON		MFG.		2N983-0			MODEL
	RET/EXH FAN HP				MFG.					MODEL
6000	CFM-HTG	6000	CFM-CLG	10%	MIN %OA	100%	MAX %OA	100%	% HTG AR	EA SERVED

				COILS:				
х	NONE		STM	нw	ELEC		MOD VLV	PREHEAT
	NONE	х	STM	HW	ELEC	х	MOD VLV	HEATING
Х	NONE		STM	HW	ELEC		MOD VLV	REHEAT
х	NONE		STM	HW	ELEC		MOD VLV	HUMID.
	NONE	х	DX	cw		х	MOD VLV	COOLING

				C	PERATI	ON:					
HOURS	ON:		S	м	т	w	Т	F	S	COMMENTS	· · · · · · · · · · · · · · · · · · ·
PRESENT	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT	STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES	
REQUIRED	START TIME									NO PINS	
REQUIRED	STOP TIME								***		
MONTH	S ON:					· · · · · · · · · · · · · · · · · · ·				1	
J	F	М	Α	м	J	J	Α	S	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

				CONTRO	LS:				
	х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Υ	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Υ	YES		NO					
COMMENTS:						<u> </u>	<u> </u>		

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY: CHECKED BY: DMS AJN

BLDG:

639

FILE: 639FC1

	AIR HANDLING UNIT SURVEY	OBSERVATIONS	
FC-1	AHU NO.	GAME ROOM	LOCATION (RM)
C.P.	REF. SYS. SERVING AHU	GAME ROOM	SERVES AREA

			UNIT TYP	E:		
SINGLE ZN	Х	2-PIPE FC	4-PIPE FC	UNIT HTR	H&V	
MULTIZONE		DOUBLE DT	REHEAT	INDUCTION	VAV	
NUMBER OF Z	ONES		OTHER			
COMMENT:						

					ı				T		
LIMATE	LIMATE CONTROL				MFG.	8-DHU331000 N			MODEL		
0.5	SUPPLY FAN H	IP.			MFG.				MODEL		
0.0	RET/EXH FAN	EXH FAN HP MFG.		MFG.				MODEL			
1000	CFM-HTG	1000	CFM-CLG	0%	MIN %OA	MAX %OA	50.0%	% HTG AREA	SERVED		
COMMEN	Т:	TOTAL HP	AND CFM FOR	NT: TOTAL HP AND CFM FOR TWO FAN COILS							

				COILS:			
х	NONE		STM	нw	ELEC	MOD VLV	PREHEAT
	NONE	x	STM	нw	ELEC	MOD VLV	HEATING
х	NONE		STM	нw	ELEC	MOD VLV	REHEAT
х	NONE		STM	нw	EVAP MEDIA	MOD VLV	нимір.
	NONE	×	DX	cw		MOD VLV	COOLING

					OPERAT	ION:					
HOURS C	DN:		S	М	Т	w	Т	F	S	COMMENTS	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400	NO TIMECLOC	К
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	ON:										
J	F	M	Α	M	J	J	Α	S	0	N	D
1	1	1	1	,1	1	1	1	1	1	1	1

	CONTROLS:													
		PNEUMATIC	×	ELECTRIC		ELEC'NIC	DDC	COMMENTS						
THERMOSTAT TYPE:	х	SINGLE STPT		DUAL SETPNT		SETBACK								
SPACE SETPOINT (°F):	72	OCC HEAT	72	UNOCC HEAT		OCC COOL	UNOCC COOL							
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK	N	MIXED AIR	OTHER							
DAMPER CONTROL:	N	MIN OA (Y/N)	N	MAX OA (Y/N)	Υ	RA (Y/N)	EA (Y/N)							
	N	MA CONTROL	N	ECONO-DB	N	ECONO-ENT	OTHER							
DEMAND LIMIT:	N	(Y / N)												
COMMENTS:														

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

DATE:

EMC NO.: 1406-011

PREPARED BY:

Feb-96 DMS

CHECKED BY:

AJN

.00711014.111.220	BLDG:	639	FILE:	639CH1
REFRIGE	RATION EQUIPMENT SU	URVEY OBS	ERVATIONS	
ACCU-1	CHILLER/COMPRESSOR NO.		MECH. ROOM	LOCATION (RM)

				UNIT T	YPE:			
	CENTRIFUC	SAL WITH W	ATER SIDE COOL	ING TOWER		OTHER		
	RECIPROCA	ATING WITH	WATER SIDE CO	OLING TOWER	х	AHU'S SERVED	AHU-1	
х	RECIPROCA	ATING WITH	AIR COOLED CO	NDENSING UNIT				
	ABSORBTIO	AW HTIW NO	TER SIDE COOL	NG TOWER	<u> </u>			
	AIR COOLE	D CONDENS	ING UNIT					
	CHW	х	DX	OTHER				

					NAM	EPLATE:				
CHILLER	CARRIER	MFG.	38ADO24520			MODEL	P29319			SERIAL NO
230	VOLTS	76	AMPS	3	PH	60	HZ	20.5	CAPACITY	(TONS)
TOWER	<u> </u>	MFG.				MODEL				# OF FANS
	VOLTS		AMPS		РН		HŻ		HP	
CW PUMP	<u> </u>	MFG.				MODEL				SERIAL NO
	VOLTS		AMPS		РН		HZ		НР	
CNW PUM	P	MFG.				MODEL				SERIAL NO
	VOLTS	1	AMPS		PH		HZ		HP	

				С	PERATI	ON:					
HOURS (ON:		s	м	Т	w	Т	F	s	COMMENT	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED	START TIME										
REQUIRED	STOP TIME									<u> </u>	*
MONTHS	ON:										
J	F	М	А	М	J	J	Α	S	0	N	D
0	0	0	0	1	1	1	1	1	0	0	0

	CONTROLS:											
	PNEUMATIC	x	ELECTRIC	ELEC'NIC	DDC	COMMENTS						
SETPOINTS	CWS (oF)		CWR (oF)	CNWS (oF)	CNWR (oF)							
PANEL INDICATORS												
- PRESSURÉ	LITE-HI		LITE-LOW	GAUGES								
- TEMPERATURE	LITE-HI		LITE-LOW	GAUGES								
- OTHER						<u> </u>						
COMMENTS: FI	W RADIO CONTROL											

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011 DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY:

AJN

	BLDG:	639	FILE:	639CH2
REFRIC	GERATION EQUIPMENT	SURVEY C	BSERVATIONS	
ACCU-2	CHILLER/COMPRESSOR NO.		OUTSIDE BLDG	LOCATION (RM)

639

BLDG:

				UNIT T	YPE:			
	CENTRIFUG	AL WITH W	ATER SIDE COOL	ING TOWER		OTHER		
	RECIPROCA	TING WITH	WATER SIDE CO	OLING TOWER	х	AHU'S SERVED	FC-1	
x	RECIPROCA	TING WITH	AIR COOLED CO	NDENSING UNIT				
	ABSORBTIC	N WITH WA	ATER SIDE COOLI	NG TOWER				
	AIR COOLE	D CONDENS	ING UNIT					
	CHW	×	DX	OTHER	 			

	NAMEPLATE:													
CHILLER	>	MFG.	CLIMATE CON	TROL	N	MODEL NOs. NOT LEGIBLE			SERIAL NO.					
230	VOLTS	15.2 AMPS 3 PH				60	HZ	Y (TONS)						
TOWER		MFG.			N	ODEL		—-L		# OF FANS				
	VOLTS		AMPS	PH			HZ		HP					
CW PUMP		MFG.			M	ODEL			<u> </u>	SERIAL NO.				
	VOLTS		AMPS	PH			HZ		НР					
CNW PUM	Р	MFG.			М	ODEL		<u> </u>	1	SERIAL NO.				
	VOLTS		AMPS	PH		·	HZ	T	НР	021117121101				
COMMENT	S:				<u>l</u>		I	L						

		(OPERATI	ON:	100				
HOURS ON:	S	М	т	w	Т	F	S	COMMENT	
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400		
REQUIRED START TIME							· · · · · · · · · · · · · · · · · · ·		
REQUIRED STOP TIME									
MONTHS ON:			<u></u>			L		<u> </u>	
J F M	Α	М	J	J	Α	s	0	N	
0 0 0	0	1	1	1	1	1	0		

	PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	CWS (oF)		CWR (oF)	CNWS (oF)	CNWR (oF)	
PANEL INDICATORS						
- PRESSURE	LITE-HI		LITE-LOW	GAUGES		+
- TEMPERATURE	LITE-HI		LITE-LOW	GAUGES		
- OTHER						
COMMENTS: FM	RADIO CONTROL			77.		

ANNUAL ENERGY SAVINGS SUMMARY FOR BRIGADE HQ's - BUILDINGS 636, 741, 844, & 1018

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
636	156.79	145.29	11.50	42.40	41.60	0.80	1034.76	991.86	42.90

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
1			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 636	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
741	9,236	9,236	1.000	11.50	11.50	0.80	0.80	42.90	42.90
844	9,890	9,236	1.071	11.50	12.32	0.80	0.86	42.90	45.94
1018	9,890	9,236	1.071	11.50	12.32	0.80	0.86	42.90	45.94

^{*}Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak			Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
636	156.79	144.81	11.98	42.40	41.60	0.80	1034.76	989.68	45.08

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 636	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
741	9,236	9,236	1.000	11.98	11.98	0.80	0.80	45.08	45.08
844	9,890	9,236	1.071	11.98	12.83	0.80	0.86	45.08	48.27
1018	9,890	9,236	1.071	11.98	12.83	0.80	0.86	45.08	48.27

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR BRIGADE HQ's - BUILDINGS 636, 741, 844, & 1018

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
636	\$ 57,789

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 636	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
741	9,236	9,236	1.000	\$57 <i>,</i> 789	\$57,789
844	9,890	9,236	1.071	\$57,789	\$61,881
1018	9,890	9,236	1.071	\$57,789	\$61,881

^{*}Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
636	\$61,061

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 636	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
741	9,236	9,236	1.000	\$61,061	\$61,061
844	9,890	9,236	1.071	\$61,061	\$65,384
1018	9,890	9,236	1.071	\$61,061	\$65,384

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

			ENERG	Y CONSERV	ATION INVESTMENT	PROGRAM (ECIP)		
		LOCATION:	Fort Leonard	Wood	REGION: 2 (Missouri	j)	PROJECT NO:	1406-011
		PROJECT TITLE:			late Brick Buildings	•	FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96	,, 0.000,,00	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INV	ESTMENT:	BLDG 636 - II	NSTALL 3.5"	FIBERGLASS BATT I	INSULATION ON V	VALLS	
	A.	CONSTRUCTION COS	ST	=			\$51,141	
	В.	SIOH COST	(7.0	0% of 1A) =			\$3,580	
	C.	DESIGN COST	(6.0	0% of 1A) =			\$3,068	
	D.	TOTAL COST	(1A +	+1B +1C) =			\$57,789	
	E.	SALVAGE VALUE OF	EXISTING EQU	JIPMENT =			\$0	
	F.	PUBLIC UTILITY COM	IPANY REBATE	=			\$0	
	G.	TOTAL INVESTMENT	(1	D -1E -1F) =			>	\$57,789
2.	ENE	RGY SAVINGS (+) OR	COST (-):					
	DAT	E OF NISTIR 85-3273	-10 USED FOR	DISCOUNT I	FACTORS:	JAN '96		
		ENERGY	FUEL COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
		SOURCE	\$/MBTU (1)	MBTU/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5)	
	Α.	ELECT.	\$7.33	11.50	\$84	13.80	\$1,162	
	В.	DIST	\$0.00	0	\$0	0.00	\$0	
	C.	NAT GAS	\$5.30	42.90	\$227	17.76	\$4,038	
	D.	COAL	\$0.00	0	\$0	0.00	\$0	
	E.	ELEC. DEMAND			\$59	13.47	\$800	
	F.	TOTAL		54.40	\$371		 >	\$6,000
3.		I-ENERGY SAVINGS (- ANNUAL RECURRING		· •				
		1 ANNUAL MAINTEN	IANCE		\$ 0		\$O	
		2			\$ 0		\$0	
		3			\$0		\$0	
		4 TOTAL ANNUAL D	ISC. SAVINGS	(+) / COST	\$0		\$0 ·	
:	В.	NON-RECURRING (+/	'-)					
		ITEM	;	SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
			(COST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)	
						(TABLE A-2		
		a. BASELINE EQUIP. R	EPLCMNT.				\$0	
		b.					\$0	į
ŀ		c.					\$0	
		d.					\$0	
		e.					\$0	
		f. TOTAL		\$0			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+	OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	ST YEAR DOLLAR SAV	'INGS (+) / CO	STS (-)	(2	2F3 + 3A4 + (3Bf1/E	Economic Life))	\$371
5.	SIM	PLE PAYBACK (SPB) II	N YEARS (MUS	T BE < 10 Y	EARS TO QUALIFY)	(1G/4) =		155.77
6.	тот	AL NET DISCOUNTED	SAVINGS			(2F5 + 3C) =		\$6,000
7.	DIS	COUNTED SAVINGS-T	O-INVESTMEN	T RATIO (SIR)	(6/1G) =		0.10
L		(MUST HAVE SIR >	1.25 TO QUAL	IFY)				

ENGIN	IEER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	1	P	_
PROJECT	F	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woc	od, MO			DATE PREPARED	PARED	18-F	18-Feb-96
ENGINEER	ER.	E M C Engineers, Inc.					ESTIMATOR	JR.	Ö	Sinz
		Denver, CO					СНЕСКЕВ ВУ) BY	Z V	A. Niemeyer
.! -				MA	MATERIAL COST	ST	II — I	ABOR COS		
S G	Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-		BUILDING 636								2012
7		INSTALL 3.5" BATT INSULATION								
ო										
4										
ည	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	3382.0	\$0.18	\$613	1-CARP	0.007	\$622	\$1,235
ာ ၊	Ω	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3150.0	\$0.20	\$630	2-CARP	0.017	\$2,814	\$3,444
\	WS.	INSTALL 2"x4" STUDDED WALL 2" OC	Ľ.	3368.0	\$0.24	\$794	F-2	0.009	\$1,670	\$2,464
∞ α	1 CP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3382.0	\$0.07	\$226	1-PORD	0.01	\$816	\$1,042
D (KSWP	RELUCATE 3:-0" AFF WOOD PANELING	S. T.	1222.0	\$0.91	\$1,107	F-2	0.063	\$4,243	\$5,350
2 ;	7 L	RELUCATE FAN COIL UNIT	Ш	20.0	\$20.30	\$406	9-0	5.67	\$9,919	\$10,325
= 5	X C	RELOCATE ELECTRICAL OUTLET	Ë	11.0	\$7.97	\$88	1-ELEC	0.896	\$300	\$388
71	Х П (RELUCALE FIRE EXTINGUISHER	i E	0.	\$0.00	\$0	1-CARP	0.2	\$5	\$5
<u>.</u>	XXX	RELUCALE SLOP SINK	Ë	1.0	\$38.33	\$38	ج 1-	2.67	\$319	\$358
4 1	2 6	KELUCATE TELEPHONE JACK	Ë	1.0	\$20.03	\$20	1-ELEC	0.333	\$10	\$30
<u>ဂ</u> (N (RELUCATE FOILET STALL	Ë	2.0	\$0.00	\$0	2-CARP	3.536	\$372	\$372
ا م	XWX.	RELOCATE WOOD SHELF	L.	2.0	\$1.22	\$2	1-CARP	0.12	\$6	\$3
· · · · · ·	¥ i	RELUCATE CEILING TILE - 4'-0" FROM WALL	ш.	469.0	\$1.14	\$537	1-CARP	0.134	\$1,651	\$2,188
Σ ς	Z/L-9MI	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	232.0	\$0.84	\$195	2-CARP	0.02	\$244	\$439
19	3 -	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	232.0	\$1.83	\$425	2-TILE	0.084	\$944	\$1,369
5.0	RDR	RELOCATE DRAPERIES, WINDOW SHADES	Ë	80.0	\$0.00	\$0	L-2	0.744	\$2,762	\$2,762
27.				:					1	
7 5				:						
24										
25				:						
26				1						
27		SUBTOTAL				\$5,081			\$26,698	\$31,779
788	DIFF	DIFFICULTLY FACTOR			2%				\$1,335	\$1,335
53 53	!	SUBTOTAL				\$5,081			\$28,033	\$33,114
00 (H _O	OVERHEAD			17%	\$864			\$4,766	\$5,629
31	:	SUBTOTAL				\$5,945			\$32,798	\$38,743
32	PRO	PROFIT			10%	\$594			\$3,280	\$3,874
33		SUBTOTAL				\$6,539			\$36,078	\$42,617
99 14 1	CONT	CONTINGENCY			20%	\$1,308			\$7,216	\$8,523
ςς 	IOIAL COSI	JSI				\$7,847			\$43,294	\$51,141

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

			LIVEN	JI CONSENT	ATTOM NEVEOTIMENT	, , , , , , , , , , , , , , , , , , ,		
		LOCATION:	Fort Leonard	Wood	REGION: 2 (Missouri	i)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Energ	y Study, Insu	late Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
						ON MALL C		
1.		ESTMENT:	-		RIGID INSULATION	UN WALLS	\$54,036	
		CONSTRUCTION COS		= 000 -4.14			\$3,783	
	В.	SIOH COST	•	0% of 1A) =			\$3,783	
	C.	DESIGN COST		0% of 1A) =			\$61,061	
	D.	TOTAL COST	· ·	+1B +1C) =			\$61,081 \$0	
	E. -	SALVAGE VALUE OF					\$0 \$0	
	F.	PUBLIC UTILITY COM						
	G.	TOTAL INVESTMENT	(1	D -1E -1F) =			>	\$61,061
2.	ENE	RGY SAVINGS (+) OR	COST (-):					
	DAT	TE OF NISTIR 85-3273-	10 USED FOI	R DISCOUNT F	FACTORS:	JAN '96		
		ENERGY	FUEL COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED)
		SOURCE	\$/MBTU (1)	MBTU/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5))
	Α.	ELECT.	\$7.33	11.98	\$88	13.80	\$1,211	
	В.	DIST	\$0.00	0	\$0	0.00	\$0	
	C.	NAT GAS	\$5.30	45.08	\$239	17.76	\$4,243	
	D.	COAL	\$0.00	0	\$0	0.00	\$0	
	E.	ELEC. DEMAND			\$59	13.47	\$800	
	F.	TOTAL		57.06	\$386		>	\$6,254
3.		N-ENERGY SAVINGS (- ANNUAL RECURRING 1 ANNUAL MAINTEN 2	(+/-))	\$0 \$0		\$0 \$0	
		3			\$O		\$0	
		4 TOTAL ANNUAL D	ISC. SAVINGS	(+)/COST	\$0		\$0	
	В.	NON-RECURRING (+/	'-)					
	٥.	ITEM	•	SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	,
				COST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)
				•		(TABLE A-2)	*
		a. BASELINE EQUIP. R	EPLCMNT.				. \$0	
		b.					\$0	
		C.					\$0	
		d.					\$0	
		e.					\$0	
		f. TOTAL		\$0			\$0	
	c.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+) OR COST (-)	(3A4 + 3Bf4) =		\$0
	5 15.	OT VEAR BOLLAR CAV	(INCC / .) / C/	NOTE ()	,,	DEO OAA /OD61/	Economic Life))	\$386
1		ST YEAR DOLLAR SAV			·	2F3+3A4+(3Bf1/ - /1G/4\	Economic Ene//	158.17
l		IPLE PAYBACK (SPB) II		21 RE < 10 A	EARS TO QUALIFY)	(1G/4) = (2F5 + 3C) =		\$6,254
		TAL NET DISCOUNTED		IT DATIO (ÉID	1	(2F5 + 3C) = $(6/1G) =$		0.10
 /·	צוט	COUNTED SAVINGS-T (MUST HAVE SIR >			ı	(0/10) =		0.10
L		(MOST TIAVE SIN >	1.25 10 QUAI	-11 1/				

ENGIN	VEER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	_	P	-
PROJEC	ï	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woo	od, MO			DATE PREPARED	EPARED	18-F	18-Feb-96
ENGINEER	ER	E M C Engineers, Inc.					ESTIMATOR	OR	D	D. Sinz
		Denver, CO					СНЕСКЕР ВУ	ЭВУ	Ā.	Niemeyer
<u>.</u>	140 mg/l		:	MA	MATERIAL COST	ST	1 – 1	LABOR COS	ΣŢ	
No.	Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAI
1		BUILDING 636								
2		INSTALL 1.5" RIGID INSULATION ON WALLS			:					
6										
4 4	7	MOTAL LOCAL CION COLOR								
ဂ ဖ	11-1/2KI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3382.0	\$0.59	\$2,000	1-CARP	0.008	\$711	\$2,711
0 1	2 2	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3150.0	\$0.20	\$631	2-CARP	0.017	\$2,814	\$3,445
\ - -	ST TO	INSTALL 3/4"X2" FURRING STRIPS	Щ. Н	1340.0	\$0.19	\$256	1-CARP	0.016	\$563	\$819
0 0	7 5	INSTALL TWO COATS OF PAINT ON DRYWALL	S.	3382.0	\$0.07	\$226	1-PORD	0.01	\$816	\$1,042
א ק	KSWVF	RELUCATE 3-0" AFF WOOD PANELING	S. T.	1222.0	\$0.91	\$1,107	F-2	0.063	\$4,243	\$5,350
2 ₹	7. C	RELUCATE FAN COIL UNIT	Ë.	20.0	\$20.30	\$406	9-0	5.67	\$9,919	\$10,325
= {	אר היי	RELUCATE ELECTRICAL OUTLET	Ä	11.0	\$7.97	\$88	1-ELEC	0.896	\$300	\$388
7 5	Х Т	RELOCATE FIRE EXITINGUISHER	EA.	0.1	\$0.00	\$0	1-CARP	0.2	\$5	\$5
<u>5</u>	XXX Y	RELOCATE SLOP SINK	E	0.	\$38.33	\$38	Ģ	2.67	\$319	\$358
4	בול	KELUCATE TELEPHONE JACK	Ë	1.0	\$20.03	\$20	1-ELEC	0.333	\$10	\$30
15	N :	RELOCATE TOILET STALL	Ë	2.0	\$0.00	\$0	2-CARP	3.536	\$372	\$372
16	KWS	RELOCATE WOOD SHELF	<u>.</u>	2.0	\$1.22	\$2	1-CARP	0.12	\$6	6\$
<u> </u>	KA :	RELOCATE CEILING TILE - 4'-0" FROM WALL	Ľ.	469.0	\$1.14	\$537	1-CARP	0.134	\$1,651	\$2,188
20,00	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	232.0	\$0.84	\$195	2-CARP	0.02	\$244	\$439
13	<u>-</u>	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	232.0	\$1.83	\$425	2-TILE	0.084	\$944	\$1,369
50	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EA.	80.0	\$0.00	\$0	L-2	0.744	\$2,762	\$2,762
21									:	
22										
23										
24 2		The state of the s		:						
52 26										
27		SUBTOTAL				\$5 932			\$25,670	£31 £11
28	DIFF	DIFFICULTLY FACTOR			5%				\$1 284	41.284
53		SUBTOTAL			!	\$5 932			\$26.963	#32, 24 #32, 805
30	ЮН	OVERHEAD			17%	\$1,008			\$4 584	\$5,592
31		SUBTOTAL				\$6.940			\$31.547	438 487
32	НО	OVERHEAD		:	170%	64 180			96.262	101,000
33		SUBTOTAL		:	0/ /-	\$1,100 \$8,120			\$5,363 \$36,040	\$6,543
34	CONT	CONTINGENCY			%02	\$1,50			47 382	\$43,030
35	TOTAL COST	TSI		:	2	\$9,744			\$44.202	\$3,000
			T						101,114	200'F0#

E M C ENGINEERS, I	NC.					DATE:	Feb-96
PROJECT: LIMITED ENERGY ST	TUDY, INSULATE B	RICK BUILE	DINGS			BY:	DMS
CLIENT CONTRACT NO.: DACA	01-94D-0033					JOB:	1406.011
						CUK.	A 131
LOCATION: FT LEONARD WOO	ID, MO.					CHK:	AJN
						FILE:	636BHL
BUILDI	NG HEATING L	OAD C	ALCULA	TION SHEE	:T		
BLDG NO: 636	BLDG NAME:	BRIGADE	HEADOIIA	DTEDO			
BLDG NO: 636 BLDG FUNCTION:	BRIGADE HEADO		HEADQUA	N I ENS			
FLOOR AREA: (SQ. FT)	9,044					# FLOORS	3
SLAB PERIMETER: (FT)	235					•	
LABEAC: W. LEIELD VERIEIED	FLEVATION DI ANG	-1					
I. AREAS: ([] FIELD VERIFIED	ELEVATION PLANS	NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS	(SQ. FT)	722	722	1,507	1.907	4,858	
GLASS	(SQ. FT)	159	174	495	497	1,325	
PERSONNEL DOOR	(SQ. FT)	49		23	80	152	
INSULATED PANEL	(SQ. FT)	0	0	0	0	0	
WALLS, NET	(SQ. FT)	514	548	990	1,330	3,382	
ROOF AREA (OR CEILING AREA	(SQ. FT)) PERSONN	FL DOOP	(SQ. FT)	3,417 152	
BASEMENT WALLS	(SQ. FT)	0	0	0	0	152	
II. CONSTRUCTION: ([] FIELD							
WALLS: (SKETCH CROSS SECT		IOOF, WIN	DOW, DO		OMPONEN	TS I	R-VALUE
Wiles. (BRETON GROUD GEO.	TOTA OF TOTALLY				OUTSIDE		0.17
					4" FACE I		0.43
				_	AIR SPAC	E	0.91
					6" CMU		1.89
				5. 6.			
				=-	INSIDE AI	R FILM	0.68
				,.		R-WALL =	4.08
						U = 1/R	0.245
ROOF: (SKETCH CROSS SECTION	ON OF ROOF)				OMPONEN		R-VALUE
					OUTSIDE BUILT UP		0.17
					3" RIGID		12.00
				4.	6.5" CON	C. SLAB	1.30
					CEILING S		1.00
					6" FB BA		19.00
					ACOUSTI INSIDE AI		1.35 0.68
				3.		R-ROOF =	35.73
						U = 1/R	0.028
GLASS TYPE:	PPG 'PENNVERNO	ON' C.L. T	WNDV, SS	A, .88 S.C.		R-GLASS	1.61
SLAB TYPE FLOOR:	CONCRETE					SLF	0.87
BASEMENT TYPE: INSULATED PANEL:	NONE NONE					R-BASEM. R-PANEL	0.00
PERSONNEL DOOR TYPE:	METAL ·					R-PDOOR	2.38
III. INFILTRATION:							
TIGHT WALL H/M/L (SQ.FT.)			X CFM /	SQ.FT.	0.000	<u>`</u>	0
AVG. WALL H/M/L (SQ.FT.)	L	4006	X CFM /		0.092	=	369
LEAKY WALL H/M/L (SQ.FT.)			X CFM /		0.000	=	0
DOOR OPENINGS / HR - SINGLE		20		OPENING /HR	1.600	=	32
DOOR OPENINGS / HR - DOUBLE	DOORS	25		OPENING /HR	1.385	=	35
			TOTAL IN	ILTRATION (C	F (VI)	=	435
UA PANEL	PANEL AREA	0		X PANEL "U"	0.000	. =	0
UA PDOOR	PDOOR AREA	152		X DOOR "U"	0.420	=	64
UA WALL	WALL AREA	3,382		X WALL "U"	0.245	=	828
UA ROOF UA GLASS	ROOF AREA GLASS AREA	3,417 1,325		X ROOF "U" X GLASS "U"	35.730 0.621		122,089 823
UA SLAB	SLAB PERIM.	235		X SLF	0.870		204
UA BASEM.	B-WALL AREA	0		X BASE. "U"	0.000	=	0
INFILTRATION	CFM	435		X A. T. F.	1.035	=	450
				TOTAL UA (BT	U/HR°F)		124,459
		-			_,		, .50

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

PREPARED BY CHECKED BY:

DMS

AJN

FILE: BLDG: 636 636

ZONE:

	Rates of Heat Gain from Occupants of Conditioned Spaces													
Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)						
0	30	4	Seated, light work, typing	Offices, hotels, apts	250	200	7,500	6,000						
TOTA	30					TOTAL	7,500	6,000						

	Peak Wattage Value for Lights										
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage						
0	210	2	Fluorescent, 2 - 40w lamps, 16w ballast (1x4 ft. fixture)	96	20,160						
	50	20	Incandescent - 100w	100	5,000						
TOTA	260			TOTAL	25,160						

	Peak Value for Internal Gains													
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)							
0	17	3	Microcomputer	350	91%	5,950	20,307							
	4	24	Coffee Maker	1,500	30%	6,000	20,478							
	1	49	Radio	71	10%	71	242							
i	2	70	Water Cooler	700	50%	1,400	4,778							
	13	5	Printer (laser)	870	34%	11,310	38,601							
	2	25	Cold Food/Beverage	1,535	50%	3,070	10,478							
	3	10	Copiers (Large)	1,570	20%	4,710	16,075							
	5	12	Typewriter	100	10%	500	1,707							
	1	56	Refrigerator/Freezer(Frostless 14 cu. ft.)	615	35%	615	2,099							
				TOTAL	43%	33,626	114,766							

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO EMC NO.:

1406-011

DATE: PREPARED BY:

26-Jan-96 DMS

CHECKED BY:

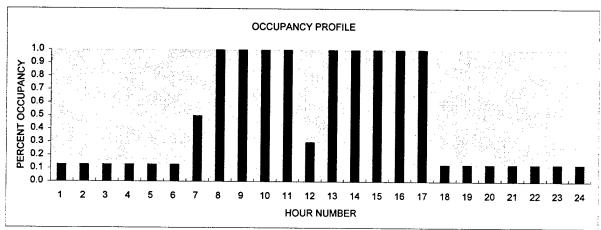
AJN

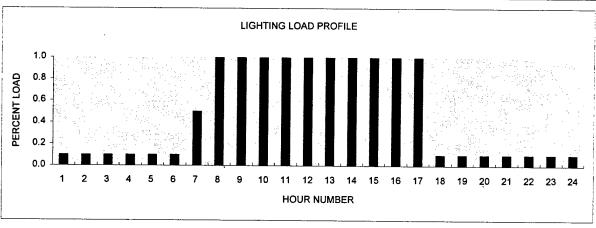
FILE: BLDG:

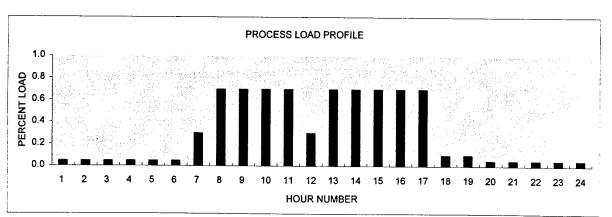
ZONE:

636 636

BLDG	BLDG	TYPE OF		HOUR NUMBER																						
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	Brigade HQ	OCCUPANCY	0.1	0.1	0.1	0.1	0.1	0.1	0.5	1.0	1.0	1.0	1.0	0.3	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.7	0.7	0.7	0.7	0.3	0.7	0.7	0.7	0.7	0.7	0.1	0.1	0.1	0.1	0.1	0.1	0.1







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BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA ------
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
                                                 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
                                                9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 72345.600000
FLOOR AREA (SQFT) 9044.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 828500.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)
                                                 -448500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 90430.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 763.000000
INFILTRATION PROFILE
          .600 .600 .600 .600 .600 .600
1.00 1.00 1.00 1.00 1.00 1.00
.600 .600 .600 .600 .600
 .600 .600 .600
                                                                         1.00
 1.00
                                                            .600
 1.00
                                                                          .600
A FACTOR IN INFILTRATION EQUATION (CINA) 2.300000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 17905.540000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 331.250000 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 63.70000
WINDOW GLASS NUMBER (NG) 30
                               63.700000
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                              7.856054E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 7.856054E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                   WALL DATA
                                   1 2
.00 90.00
WALL NUMBER
AZIMUTH ANGLE (AZ)
                                              90.00 180.00 -90.00
WALL AREA SQFT (AWLL)
                            548.2 1329.2 514.1 990.0
158.9 497.2 173.8 495.0
5.5 5.5 5.5 5.5
WINDOW AREA SQFT (AWND)
WINDOW HEIGHT FT (WNDH) 5.5 5.5 5.5 WINDOW WIDTH FT (WNDW) 28.9 90.4 31.6 WIDTH OF OVERHANG (WOH) .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0
                                                                    90.0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.245	.245	.245	.245
CN FACTORS	.01837	01837	01837	01837
CN FACTORS NUMBER OF BN FACTORS (NB	5	.01037	.01037	.01037
BN FACTORS BN (BN)	3	3	3	5
,,	00003	00003	00003	00000
N=2	.00003	.00003 .00283	.00003	.00003
N=3	.00283	.00283	.00283	.00283
N=1 N=2 N=3 N=4 N=5	.01017	.01017	.01017	.01017
N=5	.00498	.00498	.00498	.00498
N=2	.00037	.00037	.00037	.00037
N=6	******	******	*****	*****
NUMBER OF DN FACTORS (ND) DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 3416	*****	*****	*****	*****
ROOF AREA SQFT (AROF) 3416	.750000			
ROOF U VALUE BTU/HR-SQFT-F (UR	2F) 2.80	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y	TES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)				
ROOF B TRANSFER FUNCTIONS (BNR				
.000 .137E-05 .206E-04	.679E-04	.508E-04	.961E-05	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.				
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SK		00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT			00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (.000000E+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR S				1
SKY LIGHT AREA SOFT (ASKY)	0.000000E+	00	_	*
SKY LIGHT AREA SQFT (ASKY) DAYTIME SKY LIGHT U BTU/SQFT-H	R-F (SKYII)	1	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	3.800000	E-01
		(/	_,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET

					POINT D	EG F
	KW -		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	38814.	7500.	6000.		
HOUR	HO	URLY FRACT	ION OF PEA	AK		
1	.100	.000	.150	.150	70.0	76.0
2	.100	.000	.150	.150	70.0	76.0
3	.100	.000	.150	.150	70.0	76.0
4	.100	.000	.150	.150	70.0	76.0
5	.100	.000	.150	.150	70.0	76.0
6	.100	.000	.150	.150	70.0	76.0
7	.500	.100	.500	.500	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
1.000
.900 1.000
.800 1.000
.700 .300
.800 1.000
.900 1.000
.900 1.000
.900 1.000
.200 .150
.000 .150
.000
                   .900
                          1.000
                                     1.000
                                                  70.0
                                                            76.0
  9
          1.000
          1.000
                                     1.000
                                                  70.0
                                                            76.0
  10
                                     1.000
          1.000
                                                  70.0
                                                            76.0
  11
                                      .300
                                                  70.0
                                                            76.0
  12
          1.000
                                                  70.0
                                                            76.0
                                     1.000
  13
          1.000
                                                 70.0
                                                            76.0
          1.000
                                     1.000
  14
                                                           76.0
                                                 70.0
  15
          1.000
                                     1.000
                                                           76.0
          1.000
                                     1.000
                                                 70.0
  16
                                     1.000
                                                 70.0
                                                           76.0
  17
          1.000
           .100
                                                 70.0
                                                           76.0
                                      .150
  18
           .100
                                      .150
                                                 70.0
  19
                                       .150
                                                 70.0
                                                           76.0
  20
           .100
                             .150
                                       .150
                                                 70.0
                                                           76.0
            .100
                    .000
  21
                                                 70.0
                             .150
                                                           76.0
                                       .150
  22
            .100
                    .000
                    .000
                                                           76.0
                                                  70.0
  23
            .100
                              .150
                                       .150
                          .150
.150
                                       .150 70.0
                                                           76.0
            .100
                    .000
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                           65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 13450.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 0.000000E+00
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.500000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 828500.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 994200.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                      .400 .451
.100 .191 .200 .286 .300 .369
                                             .718
                                                       .800
         .537
                           .625
                                     .700
                                                                .812
                  .600
.500
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 3
                           1.00
COOLING PLANT RATED OUTPUT BTU (CFLOT) 448500.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 112125.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                      .000
                                                               .000
       .000 .000 .000 .000
 .000
         .000
                                     .000
                                             .000
 .000
                  .000
                           .000
                                                       .000
                                                                .000
 .000
         .000
                  .000
                           .000
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BEACON Energy Analysis By EMC Engineers, Inc.

636.I

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	ΓN				
			SOLAR		DOOR	ર			VENT	ı
1070	711 TODD		THRU		AND				AND	
	TH LOAD		WINDOW					WINDO	W INFL	LATENT
JAI	V 0.				0.		0.	0.	0.	0.
	-110.	LOSS		0.	-2.	-7.	-18.	-20.	-110.	0.
FEF	.12	GAIN	24 65	0.0	0.0					
	-86.09		24.05	.00	.00	.00	.03	.00	.00	.03
	00.03	1000		42	-1.45	-/.5/	-13.25	-17.46	-94.96	.00
MAR	4.85	GAIN	30.52	0.0	0.0	0.0	72	.00	0.0	4.0
	-71.09			- 37	-1 35	-0 45	./3 -10 F3	16.00	.00 -87.97	.40
				,	1.33	-0.45	-10.52	-16.22	-87.97	.00
APR	22.49	GAIN	32.07	.00	. 01	0.0	2 63	00	.40	2.45
	-32.56	LOSS		21	79	-7.24	-5 00	-9 55	-50.94	.00
						,	3.00	2.33	-30.94	.00
MAY	49.77	GAIN	35.09	.02	.03	.00	5.11	.30	1.38	10.41
	-11.34	LOSS		09	43	-5.51	-1.65	-4.95	-28.49	.00
										.00
JUN	97.29			.04	.08	.00	7.60	.91	4.16	36.93
	-1.48	LOSS		03	18	-3.17	27	-2.09	-9.17	.00
77.77	107	a								
001	127.	LOSS	36.	0.	0.	0.	10.		11.	50.
	0.	LUSS		0.	0.	-1.	0.	-1.	-6.	0.
AUG	119.	GATN	32.	0	0	0	0	_	_	
	-1.	LOSS	52.	0.					8. -7.	
				٥.	٥.	0.	0.	-2.	-7.	0.
SEP	71.22	GAIN	27.30	.02	.07	.31	4.67	90	4.21	27 27
	-9.77	LOSS		09	35	14	-1.70	-4 16	-22.70	00
									22.70	.00
	21.10		22.78	.00	.01	.07	1.28	.13	.58	4.66
	-28.07	LOSS		23	76	81	-5.63	-8.87	-47.48	.00
	6.27		18.08		.00	.00	.26	.00	.00	.93
	-55.33	LOSS		33	-1.10	-2.57	-10.27	-12.87	-67.55	.00
DEC	0	CATA	1 7	•	_					
DEC	-107.	LOSS	17.	0.	0.	0.	0.	0.	0.	0.
	107.	TIOSS		0.	-2.	-5.	-18.	-20.	-105.	0.
TOT	519.	GAIN	329.	0	1	7	40	_		
	-514.		023.	-3	-10	-10	40.	110	29. -637.	182.
				٥.	20.	- 4 2.	-04.	-±19.	-63/.	0.
XAM	HEATING	LOAD=	-4066	52. BT	UH ON E	EC 18 1	HOUR 4	AMR	ENT TEM	P 1.
MAX	COOLING	LOAD=	4233	26. BT	UH ON J	UL 27 1	HOUR 14	AMB1	ENT TEM	P 91.

ZONE UA BTU/HR-F 1906.1

BEACON Energy Analysis By EMC Engineers, Inc. 636.I

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

FAN TOTAL INTERNAL

INTERNAL SPAC TEMPERATURE					COIN-			HEAT MILLION			
MONTH								BTU	BTU	BTU	
JAN	70.	77.	69.	2 27	14 6	58. 4.	2.77	24.70	6.01	27.30	
FEB	71.	78.	69.	26 2	13 6		2.47	22.04	5.43	24.42	
MAR	72.	78.	69.	12 3	13 6		2.73	24.35	6.01	26.99	
APR	73.	78.	69.	24 9	14 5		2.63	23.46	5.82	26.03	
MAY	74.	78.	70.		11 5		2.77	24.70	6.01	27.30	
JUN	76.	78.	70.	22 17	13 5		2.63	23.46	5.82	26.03	
JUL	76.	78.	70.		13 5		2.73	24.35	6.01	26.99	
AUG	76.	78.	70.	30 25	12 5		2.77	24.70	6.01	27.30	
SEP	75.	78.	70.		13 6	39.	2.59	23.10		25.73	
OCT	73.	78.	70.	2 28	13 6				6.01	27.30	
NOV	71.		69.	7 3	14 6	18.	2.67			26.34	
DEC	70.	77.	69.	12 18	14 6		2.69	23.99	6.01	26.69	
YEAR							32.21	287.38	70.81	318.44	

BEACON Energy Analysis By EMC Engineers, Inc. 636.I

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
JAN	672	32	0	0	3971E+06	.0000
FEB	544	53	0	0	3252E+06	.1200E+06
MAR	523	110	0	0	3278E+06	.1972E+06
APR	342	231	0	0	2093E+06	.2405E+06
MAY	235	347	0	0	1482E+06	.3001E+06
JUN	66	414	0	0	5342E+05	.4003E+06
JUL	26	548	0	0	4176E+05	.4233E+06
AUG	28	528	0	0	6646E+05	.3951E+06
SEP	152	378	0	0	1349E+06	.4048E+06
OCT	350	233	0	0	1928E+06	.3096E+06
NOV	503	107	0	0	2723E+06	.2195E+06
DEC	671	18	0	0	4067E+06	.8655E+05
YEAR	4112	2999	0	0	4067E+06	.4233E+06

SYSTEM TOTALS

		ENERG	TOTAL INTERNAL MAXIMUM					
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC	
MONTH	MILLION BTU	THOUSAND KWH	THOUSAND KWH	MILLION BTU	THOUSAND KWH	MILLION BTU	DEMAND KW	
HOWIT	. D10	IVIII	10011	210	10011	Bio	1000	
JAN	191.93	.00	2.77	24.70	1.76	27.30	10.8	
FEB	151.88	.01	2.47	22.04	1.59	24.42	23.2	
MAR	135.07	.49	2.73	24.35	1.76	26.99	29.1	
APR	76.49	2.18	2.63	23.46	1.71	26.03	32.0	
MAY	45.93	4.62	2.77	24.70	1.76	27.30	35.6	
JUN	12.53	8.40	2.63	23.46	1.71	26.03	41.1	
JUL	4.94	10.94	2.73	24.35	1.76	26.99	42.4	
AUG	5.32	10.36	2.77	24.70	1.76	27.30	40.9	
SEP	29.71	6.26	2.59	23.10	1.71	25.73	41.4	
OCT	73.26	2.02	2.77	24.70	1.76	27.30	36.2	
NOV	119.48	.63	2.67	23.82	1.71	26.34	30.6	
DEC	188.23	.03	2.69	23.99	1.76	26.69	16.9	
YEAR	1034.76	45.94	32.21	287.38	20.75	318.44	42.4	

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 183508. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 636.I

BLDG 636 - BRIGADE HEADQUARTERS BASELINE (FT. LEONARD WOOD, MO)

OTHER MONTHLY STATISTICS

	a			011	ibic Month.	DI 5.	INITOI	105		
	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-		AVG. AMBT. DEG.	MAX SYSTEMP. DI	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	3971E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.1200E+06	3252E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.1972E+06	3278E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2405E+06	2093E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.3001E+06	1482E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.4003E+06	5342E+05
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.4233E+06	4176E+05
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.3951E+06	6646E+05
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.4048E+06	1349E+06
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.3096E+06	1928E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2195E+06	2723E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.8655E+05	4067E+06

WINDOW HEIGHT FT (WNDH)

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL ----- PROGRAM CONTROL OPTIONS -----COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1 SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) 1 NUMBER OF ZONES (NZ) WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA -----*****REAL WEATHER FROM DISK****** FILE NAME MO STATION 13995 YEAR 1955 SITE LATITUDE DEG (AL1) 37.750000 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 72345.600000 FLOOR AREA (SQFT) 9044.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 828500.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -448500.000000 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 90430.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 763.000000 INFILTRATION PROFILE .600 .600 .600 .600 .600 .600 1.00 1.00 1.00 1.00 1.00 1.00 1.00 .600 .600 .600 .600 .600 .600 1.00 1.00 1.00 .600 .600 A FACTOR IN INFILTRATION EQUATION (CINA) 2.300000E-01 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 17905.540000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 331.250000 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 63.70000 WINDOW GLASS NUMBER (NG) 30 63.700000 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 7.856054E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 7.856054E-01 WINDOW SHADING FACTOR (SHD) 5.900000E-01 WALL DATA 2 3 WALL NUMBER 1 90.00 180.00 AZIMUTH ANGLE (AZ) .00 WALL AREA SQFT (AWLL) 548.2 1329.2 514.1 495.0 WINDOW AREA SQFT (AWND) 158.9 497.2 173.8

5.5

WINDOW HEIGHT FT (WNDH) 5.5 5.5 5.5 5.5 WINDOW WIDTH FT (WNDW) 28.9 90.4 31.6 90.0 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 .0 .0

5.5

5.5

5.5

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.064	.064	.064	.064
CN FACTORS	00176	00176	00176	00176
CN FACTORS NUMBER OF BN FACTORS (NB	.00170	.00170	.00176	.00176
BN FACTORS BN (BN)	3	ے	5	5
N=1	00000	00000	00000	00000
-· -	.00000	.00000	.00000	.00000
N=3	.00016	.00016	.00016 .00086	.00016
N=4	.00086	.00086	.00086	.00086
N=5	.00066	.00066	.00016 .00086 .00066 .00008 ******	.00066
N=6	80000.	.00008	.00008	.00008
N=6 NUMBER OF DN FACTORS (ND)	*****	****	******	******
DN FACTORS (ND)	6	6	6 1.00000 -1.71064 .89735 16643 .00728 00002	6
N=1				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728	.00728
N=6	00002	00002	00002	00002
ROOF AREA SQF1 (AROF) 3416	. /50000			
ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)	1.4892	16E-04		
ROOF B TRANSFER FUNCTIONS (BNR				
.000 .137E-05 .206E-04		.508E-04	.961E-05	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36			250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00			
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SI	HSK (MND, NI	OND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.000000E+	00		
DAYTIME SKY LIGHT U BTU/SOFT-H	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKYT	JN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	3.8000001	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -	- -	BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	38814.	7500.	6000.		
HOUR	HC	URLY FRACT	ION OF PEA	4K		
1	.100	.000	.150	.150	70.0	76.0
2	.100	.000	.150	.150	70.0	76.0
3	.100	.000	.150	.150	70.0	76.0
4	.100	.000	.150	.150	70.0	76.0
5	.100	.000	.150	.150	70.0	76.0
6	.100	.000	.150	.150	70.0	76.0
7	.500	.100	.500	.500	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
1.000.9001.0001.000.9001.000
                                               70.0
  9
                                    1.000
                                                          76.0
  10
                                     1.000
                                                70.0
                                                          76.0
                          1.000
                                    1.000
  11
          1.000
                    .800
                                                70.0
                                                          76.0
                 .700 .300 .300
.800 1.000 1.000
.900 1.000 1.000
.900 1.000 1.000
                    .700
                            .300
                                     .300
  12
          1.000
                                                70.0
                                                          76.0
  13
          1.000
                                                70.0
                                                          76.0
  14
          1.000
                                                70.0
                                                          76.0
  15
          1.000
                                                70.0
                                                         76.0
  16
          1.000
                  .900 1.000 1.000
                                               70.0
                                                         76.0
  17
         1.000
                   .800 1.000
                                    1.000
                                               70.0
                                                         76.0
          .100
                  .200
  18
                                    .150
                           .150
                                               70.0
                                                         76.0
                  .000
          .100
  19
                            .150
                                               70.0
                                     .150
                                                         76.0
  20
          .100
                            .150
                                     .150
                                               70.0
                                                         76.0
                                     .150
                                               70.0
  21
           .100
                   .000
                            .150
                                                         76.0
                                                         76.0
  22
           .100
                   .000
                            .150
                                      .150
                                               70.0
                 .000 .150 .150 70.0
.000 .150 .150 70.0
 23
           .100
                                                         76.0
 24
           .100
                                                         76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 13450.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR
                              0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 0.000000E+0
SYSTEM MIXED AIR TEMP(TMXAIR) 0.000000E+00
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.500000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 828500.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 994200.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                    .400
        .191 .200 .286 .300 .369
.100
                                                            .451
.500
         .537
                  .600
                           .625
                                    .700
                                            .718
                                                    .800
                                                              .812
       .906 1.00
.900
                           1.00
CHILLER TYPE (ITYPCH) 3
COOLING PLANT RATED OUTPUT BTU (CFLOT) 448500.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 112125.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                    .000 .000
.000
      .000 .000 .000 .000
                                    .000
.000
         .000
                  .000
                           .000
                                           .000
                                                     .000
                                                              .000
.000
         .000
                 .000
                           .000
```

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	N				
			SOLAR		DOOR	}			VENT	•
			THRU		AND				AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	0.	GAIN	19.	Ο.	0.	0.	0.	0.	0.	0.
	-98.	LOSS		-1.	-2.	-7.	- 5.	-20.	-110.	0.
		GAIN	24.65	.00	.00	.00	.00	.00	.00	.03
	-77.74	LOSS		42	-1.45	-7.60	-3.49	-17.53	-96.23	.00
MAR	4.80	GAIN	30.52	.00	. 00	.00	05	.00	0.0	.40
		LOSS						-16.29		.00
					2.55	0.10	2.00	10.25	03.27	.00
APR	21.69	GAIN	32.07	.00	.01	.00	.41	.09	.40	2.37
	-31.05	LOSS						-9.54		
			35.09					.30		
	-11.71	LOSS		09	42	-5.46	19	-4.83	-28.28	.00
.TIIN	90.54	GATN	35 00	0.4	nα	0.0	1 06	.91	1 16	24 07
0011	-1.79		33.00	- 03	- 16	-3 08	1.50	-1.89	-0 31	34.07
	1.75	2000		.05	.10	5.00	.00	-1.09	-0.31	.00
JUL	115.	GAIN	36.	0.	0.	0.	3.	2.	11.	44.
	0.	LOSS		0.	0.	-1.	0.	-1.	-6.	0.
	• • • •	~~ ~~			_					
AUG			32.							
	-1.	LOSS		0.	0.	0.	0.	-1.	-7.	0.
SEP	66.16	GAIN	27.30	.02	.07	.33	1.09	.90	4.21	24.63
		LOSS		09	34	13	25	-4.08	-22.72	.00
OCT	20.79		22.78	.00	.01	.07	.19	.13 -8.87	.58	4.49
	-25.89	LOSS		23	76	81	-1.31	-8.87	-48.68	.00
NOV	6.35	GAIN	18 08	0.0	0.0	00	01	.00	0.0	0.1
	-49.36		10.00					-12.94		
	47.50	HODD		55	-1.10	-2.00	-2.62	-12.94	-60.77	.00
DEC	0.	GAIN	17.	Ο.	0.	0.	0.	0.	0.	0.
	-94.							-20.		
TOT	482.		329.					6.		
	-466.	LOSS		-3.	-10.	-49.	-21.	-119.	-643.	0.
MAX	HEATING	LOAD=	-3689	512. B	TUH ON I	DEC 18	HOUR 4	AMB	IENT TE	MP 1.
MAX	COOLING	LOAD=	4086	543. B	TUH ON	JUL 3	HOUR 12	AMB	IENT TE	MP 86.

ZONE UA BTU/HR-F 1294.0

BEACON Energy Analysis By EMC Engineers, Inc. 636FG.I

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

									FAN T	OTAL
INTERNA	INTE		SPACE			COIN-			HEAT	
MONTH			URE F			CIDENT AMBT.	THOUSAND KWH	MILLION BTU	MILLION BTU	MILLION BTU
JAN	71.	77.	69.	2 27		58. 4.	2.77	24.70	6.01	27.30
FEB	71.	78.	69.			59. 15.	2.47	22.04	5.43	24.42
MAR	72.	78.	69.	12		74. 15.	2.73	24.35	6.01	26.99
	•									
APR	73.	78.	70.	30 14		80. 30.	2.63	23.46	5.82	26.03
MAY	74.	78.	70.				2.77	24.70	6.01	27.30
JUN	75.	78.	70.	22 16		83. 55.	2.63	23.46	5.82	26.03
JUL	76.	78.	70.		13 5	93. 57.	2.73	24.35	6.01	26.99
AUG	76.	78.	70.			86. 52.	2.77	24.70	6.01	27.30
SEP	75.	78.	70.			90. 39.	2.59	23.10	5.82	25.73
OCT	73.	78.	70.	2 28	13 5		2.77	24.70	6.01	27.30
				_						
NOV	72.	78.	70.	7 3		73. 17.	2.67	23.82	5.82	26.34
DEC	71.	77.	69.			61. 1.	2.69	23.99	6.01	26.69
YEAR							32.21	287.38	70.81	318.44

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER O	F HOURS WHEI	MUMIXAM N	LOADS
		INCLUDING	LOADS W	ERE NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	652	35	0	0	3641E+06	.0000
FEB	528	69	0	0	2971E+06	.1230E+06
MAR	519	127	0	0	3005E+06	.1996E+06
APR	354	244	0	0	1906E+06	.2396E+06
MAY	265	334	0	0	1350E+06	.3022E+06
JUN	89	376	0	0	5135E+05	.3856E+06
JUL	32	482	0	0	3844E+05	.4086E+06
AUG	33	470	0	0	6087E+05	.3883E+06
SEP	157	341	0	0	1214E+06	.4024E+06
OCT	349	239	0	0	1767E+06	.3048E+06
NOV	478	118	0	0	2449E+06	.2207E+06
DEC	649	26	0	0	3685E+06	.9713E+05
YEAR	4105	2861	0	0	3685E+06	.4086E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	T FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	177.82	.00	2.77	24.70	1.76	27.30	10.8
FEB	141.87	.01	2.47	22.04	1.59	24.42	23.5
MAR	129.05	.48	2.73	24.35	1.76	26.99	29.3
APR	76.94	2.11	2.63	23.46	1.71	26.03	31.9
MAY	51.36	4.42	2.77	24.70	1.76	27.30	35.7
JUN	16.90	7.80	2.63	23.46	1.71	26.03	40.4
JUL	6.08	9.88	2.73	24.35	1.76	26.99	41.6
AUG	6.27	9.42	2.77	24.70	1.76	27.30	40.5
SEP	30.31	5.78	2.59	23.10	1.71	25.73	41.3
OCT	71.35	1.98	2.77	24.70	1.76	27.30	35.9
NOV	110.31	.64	2.67	23.82	1.71	26.34	30.7
DEC	173.60	.04	2.69	23.99	1.76	26.69	17.9
YEAR	991.86	42.57	32.21	287.38	20.75	318.44	41.6

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 177493. BTU/(SQFT-YEAR)

BLDG 636 - BRIGADE HQ ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR	ACTUAL SOLAR								
	INSOL. HORIZ. SURF. BTU/ SQFT- DAY	INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	3641E+06
FEB	1464.	929.	1.000	37.	0.	Ο.	0	0	.1230E+06	2971E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.1996E+06	3005E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2396E+06	1906E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.3022E+06	1350E+06
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.3856E+06	5135E+05
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.4086E+06	3844E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3883E+06	~.6087E+05
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.4024E+06	1214E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3048E+06	1767E+06
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.2207E+06	2449E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.9713E+05	3685E+06

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BLDG 636 - BRIGADE HO ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
                            37.750000
SITE LATITUDE DEG (AL1)
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                              1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)
                                       3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                  70.000000
                                               9.000000E-03
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 72345.600000
FLOOR AREA (SQFT) 9044.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX)
                                                 828500.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -448500.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 90430.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 763.000000
INFILTRATION PROFILE

    .600
    .600
    .600
    .600
    .600

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    .600
    .600
    .600
    .600

                                                      .600
                                                                 .600
                                                                1.00
                                                      1.00
                                                                           1.00
                                                                            .600
                                                                 .600
                                             2.300000E-01
A FACTOR IN INFILTRATION EQUATION (CINA)
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 17905.540000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 331.250000
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 63.700000
WINDOW GLASS NUMBER (NG) 30
WINDOW GLASS NUMBER (NG)
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                              7.856054E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 7.856054E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
```

	WALL DAT	ΓA		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SOFT (AWLL)	548.2	1329.2	514.1	990.0
WINDOW AREA SOFT (AWND)	158.9	497.2	173.8	495.0
WINDOW HEIGHT FT (WNDH)	5.5	5.5	5.5	5.5
WINDOW WIDTH FT (WNDW)	28.9	90.4	31.6	90.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	. 0	.0

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0 .055	120.0 .055	120.0 .055	120.0 .055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000 .00019	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=1 N=2 N=3 N=4 N=5 N=6	.00007	.00007	.00007	.00007
N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	00002
MOOL WITH POLI (WOL) 2410	. /50000			
ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF TRANS FUNCTIONS USED (1=Y)				
ROOF C TRANSFER FUNCTION (CNR)	1.4892	16E-04		
ROOF B TRANSFER FUNCTIONS (BNR .000 .137E-05 .206E-04)			
		.508E-04	.961E-05	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			0000	
SKYLIGHT HEIGHT FT (SKH) 0.0				
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO				
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	000E+00	
SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	CITCIN) V	000000		
SUMMER START MONTH AND DAY FOR				
SUMMER END MONTH AND DAY FOR SI	DUDY (NOTE)	, MD21)	1	1
SKY LIGHT AREA SQFT (ASKY)	יים ערטטטטפיי איסיי	טט (Τ.	1
DAYTIME SKY LIGHT II RTII/SOFT_U	C.UUUUUUE+	1	292999	
DAYTIME SKY LIGHT U BTU/SQFT-HINIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (CKV)	ITNI)	1 29200	
FRACTION OF PROCESS HEAT TO IN				F_01
THE THE TAX THE TAX TO THE	LIMIT OFF	CD (PAF)	3.500000	n 01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		BTU/HR - PEOPLE	 PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	38814.	7500.	6000.		
HOUR	HC	URLY FRACT	ION OF PE	AK		
1	.100	.000	.150	.150	70.0	76.0
2	.100	.000	.150	.150	70.0	76.0
3	.100	.000	.150	.150	70.0	76.0
4	.100	.000	.150	.150	70.0	76.0
5	.100	.000	.150	.150	70.0	76.0
6	.100	.000	.150	.150	70.0	76.0
7	.500	.100	.500	.500	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
.9001.0001.00070.0.9001.0001.00070.0
  9
         1.000
                                                         76.0
         1.000
 10
                                                          76.0
                                               70.0
                    .800
                          1.000 1.000
                                                          76.0
  11
         1.000
                            .300
                                    .300
                    .700
                                               70.0
                                                         76.0
  12
         1.000
                  .800 1.000 1.000
                                                         76.0
         1.000
                                               70.0
  13
                                               70.0
                                                         76.0
         1.000
                   .900 1.000 1.000
  14
                   .900
                          1.000 1.000
                                               70.0
                                                         76.0
  15
         1.000
                   .900 1.000 1.000
                                               70.0
                                                         76.0
  16
         1.000
                   .800 1.000 1.000
                                                         76.0
  17
         1.000
                                               70.0
                          .150
                                    .150
          .100
                   .200
                                              70.0
                                                         76.0
  18
                          .150
.150
.150
                                             70.0
70.0
70.0
           .100
                   .000
                                     .150
                                                        76.0
  19
                                    .150
                                                        76.0
           .100
                   .000
 20
                                    .150
                                                        76.0
 21
           .100
                    .000
                                                        76.0
                                               70.0
 22
           .100
                    .000
                                    .150
                         .150 .150 70.0
.150 .150 70.0
                                                        76.0
                                                70.0
                 .000
 23
           .100
                                                        76.0
           .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 13450.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMPL/TMY277
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.500000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 828500.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 994200.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                    .400
.100 .191 .200 .286 .300 .369
                                                              .451
.500 .537 .600
.900 .906 1.00
CHILLER TYPE (ITYPCH)
                          .625
                                           .718
                                                    .800
                                   .700
                                                              .812
                          1.00
                          3
COOLING PLANT RATED OUTPUT BTU (CFLOT) 448500.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 112125.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000 .000 .000 .000 .000
                                                    .000 .000
         .000
                          .000
                                   .000
                                           .000
                                                    .000
 .000
                 .000
                                                              .000
        .000
              .000
                          .000
 .000
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BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTIT DOOR AND	!			VENT	
MNT	H LOAD			ROOF			WAT.T.	MINDON	AND INFL	LATENT
	0.		19.							
		LOSS					-4	-20	-111.	0.
								20.	****	٠.
FEB	.12	GAIN	24.65	.00	.00	.00	.00	.00	.00	.03
	-77.34	LOSS							-96.31	
MAR	4.82	GAIN	30.52	.00	.00	.00	.05	.00	.00	.40
	-64.94	LOSS							-89.34	
APR	21.68	GAIN	32.07	.00	.01	.00	.37	.09	.40	2.37
	-30.99	LOSS			79				-51.92	
MAY	47.48	GAIN	35.09	.02	.03	.00	.97	.30	1.38	9.91
	-11.78	LOSS		09	42	-5.46	17	-4.83	-28.27	.00
JUN	90.30	GAIN	35.00	.04	.08	.00	1.69	.91	4.16	33.98
	-1.84	LOSS		03	16	-3.08	.00	-1.88	-8.25	.00
JUL			36.							44.
	0.	LOSS		0.	0.	-1.	0.	-1.	-6.	0.
3.110		~~		_						
AUG	108.	GAIN	32.	0.	0.	0. 0.	2.	2.	8. -7.	44.
	-1.	LOSS		0.	0.	0.	0.	-1.	-7.	0.
e e n	<i>6</i>	CATN	27.30	0.0	0.7	2.4				
SEP	-9.42		27.30	.02	.07	.34	.94	.90	4.21	24.43
	-2.42	позз		03	34	13	23	-4.08	-22.69	.00
OCT	20.80	GAIN	22.78	. 0.0	. 01	0.7	17	13	5.0	1 10
	-25.80	LOSS		23	76	81	-1.13	-8.87	-48 73	.00
					• • •	.01	1.15	0.07	40.75	.00
NOV	6.37	GAIN	18.08	.00	.00	.00	.01	.00	.00	.91
	-49.09	LOSS		33	-1.10	-2.60	-2.26	-12.94	-68.84	.00
DEC	0.	GAIN	17.	0.	0.	0.	0.	0.	0.	0.
	-94.								-106.	
TOT	480.	GAIN	329.	0.	1.	1.	8.	6.	29.	165.
	-464.			-3.	-10.	-49.	-18.	-119.	-643.	0.
								•		
MAX	HEATING	LOAD=	-3672	247. B	ruh on i	DEC 18	HOUR 4	AMB	IENT TEM	IP 1.
MAX	COOLING	LOAD=	4082	26. B	ruh on d	JUL 3 :	HOUR 12	AMB	IENT TEM	IP 86.

ZONE UA BTU/HR-F 1263.6

BEACON Energy Analysis By EMC Engineers, Inc. 636RGD.I

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

INTERN	ΛT								FAN T	OTAL
INTERM	INTE		SPACE URE F			COIN- CIDENT	THOUSAND		HEAT MILLION	HEAT GAIN MILLION
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	71.	77.	69.			58.	2.77	24.70	6.01	27.30
FEB	71.	78.	69.			59. 15.	2.47	22.04	5.43	24.42
MAR	72.	78.		12 3		74. 15.	2.73	24.35	6.01	26.99
APR	73.	78.	70.			80.	2.63	23.46	5.82	26.03
MAY	74.	78.	70.			77.	2.77	24.70	6.01	27.30
JUN	75.	78.	70.			83. 55.	2.63	23.46	5.82	26.03
JUL	76.	78.	70.			93. 57.	2.73	24.35	6.01	26.99
AUG	76.	78.	70.			86. 52.	2.77	24.70	6.01	27.30
SEP	75.	78.	70.	3 15		90. 39.	2.59	23.10	5.82	25.73
OCT	73.	78.	70.	2 28		79. 31.	2.77	24.70	6.01	27.30
NOV	72.	78.	70.			73. 17.	2.67	23.82	5.82	26.34
DEC	71.	77.	69.			61. 1.	2.69	23.99 .	6.01	26.69
YEAR							32.21	287.38	70.81	318.44

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

	_						
	•		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
			INCLUDING	LOADS WE	RE NOT MET	BT	J
M	ONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
ű	IAN	650	35	0	0	3632E+06	.0000
	EB	528	69	0	Ö	2962E+06	.1237E+06
	IAR	518	128	0	Ö	2997E+06	.1998E+06
	.PR	353	243	0	Ö	1901E+06	.1336E+06
	AY	265	334	0	0	1349E+06	.3020E+06
	UN	92	375	0	0	5169E+05	.3852E+06
_	UL	33	479	0	Ö	3881E+05	.4082E+06
	UG	33	468	0	Ö	6114E+05	.3880E+06
	EP	157	339	0		1212E+06	.4021E+06
	CT	349	239	0	_	1762E+06	.3047E+06
N	IOV	478	118	0	o	2440E+06	.2208E+06
Г	EC	646	26	0		3672E+06	.9781E+05
YE	AR	4102	2853	0	0	3672E+06	.4082E+06

BEACON Energy Analysis By EMC Engineers, Inc. 636RGD.I

SYSTEM TOTALS

	HENETNO		Y CONSUMPT		TO FANS	OTAL INTERNAL HEAT GAIN	MAXIMUM ELECTRIC
	HEATING MILLION	COOLING THOUSAND	LIGHTING THOUSAND	PROCESS MILLION	THOUSAND		DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	176.96	.00	2.77	24.70	1.76	27.30	10.8
FEB	141.54	.01	2.47	22.04	1.59	24.42	23.6
MAR	128.85	.48	2.73	24.35	1.76	26.99	29.3
APR	76.69	2.11	2.63	23.46	1.71	26.03	31.9
MAY	51.36	4.42	2.77	24.70	1.76	27.30	35.7
JUN	17.47	7.78	2.63	23.46	1.71	26.03	40.3
JUL	6.27	9.83	2.73	24.35	1.76	26.99	41.6
AUG	6.27	9.38	2.77	24.70	1.76	27.30	40.5
SEP	30.31	5.76	2.59	23.10	1.71	25.73	41.2
OCT	71.29	1.99	2.77	24.70	1.76	27.30	35.9
NOV	110.13	.64	2.67	23.82	1.71	26.34	30.7
DEC	172.54	.04	2.69	23.99	1.76	26.69	17.9
YEAR	989.68	42.43	32.21	287.38	20.75	318.44	41.6

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 177201. BTU/(SQFT-YEAR)

BLDG 636 - BRIGADE HQ ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/		AVG. AMBT.	MAX SY: TEMP. 1		SYSTE	S WHEN M LOADS MET	MAXIMUM COOLING LOAD	MAXIMUM HEATING LOAD
14011777	SQFT-	SQFT-	PF	DEG.	DEG	. F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	3632E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.1237E+06	2962E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1998E+06	2997E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2394E+06	1901E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3020E+06	1349E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.3852E+06	5169E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4082E+06	3881E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.3880E+06	6114E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4021E+06	1212E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3047E+06	1762E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2208E+06	2440E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.9781E+05	3672E+06

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION	ł:						
Building No: 636		Building Name:	Brigade He	eadquarters			
Surveyed by: DMS		Date:	11/7/95		Building Use:	Logistics	
Building Contact:					Phone No:		
Building Contact:					Phone No:		
OCCUPANCY:							
Number of Employees:	Mon./Fri.:	30		Schedule:	730	То	1900
	Tues./Thurs	30			730	То	1900
	Wed.	30			730	То	1900
	Sat./Sun.					То	
Visitors Per Day:	Mon./Fri.:			Schedule:		То	
	Tues./Thurs.					То	
	Wed.					То	
	Sat./Sun.					То	
Comments:							
LIGHTING SCHEDULE:	ŀ						
Normal Occupancy:	MonFri.:			Schedule:	730	То	1900
· · ·	Sat./Sun.:					То	
Cleaning Crew/2nd Shift:	MonFri.:			Schedule:		То	
	Sat./Sun.:					То	
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Chiller Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Boiler Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	To	2400
Aux. Equipment Schedule:							
	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
	MonFri.:			Schedule:		То	
						То	

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 636

Building Name: Brigade Head Quarters

EMC No. 1406-011

Prepared by: DMS

Date: 2/18/96

BUILDING ENVELOPE

		EXTERIOR WALLS	LI	ST OF EXT. WALL CONSTRUCTION TYPES
Wall	Wall			
Direction (N,	Construction		Wall Construction	
E, W, or S)	No.	Comments	No.	Description
N	XW-4		XW-I	Face Brick & CMU
E	XW-4		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-4		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-4		XW-4	Face Brick, CMU, & Plaster Coat
			XW-5	Insulated Metal Panel
		WINDOWS		LIST OF WINDOW TYPES
Window Direction (N, E, W, or S)	Window Construction No.	Comments	Window Construction No.	Description
N	W-1		W-1	Double Pane Clear
Е	W-1		W-2	Double Pane Tinted
S	W-1		W-3	Single Pane with Storm Windows
W	W-1		W-4	Single Pane
		GENERAL: Insulated metal panel on top portion of		
		windows		
	ľ	ROOF CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
	Roof			
Roof	Construction	Comments	Roof Construction	Description
Location	No.	Comments	No.	Description
ALL	R-2		R-I	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
			R-2	BUR, Rigid Insul., Metal Deck, 6" Concrete, Air Space, 6" Batt Insul., Ceiling Tile
			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
			R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaste Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaste Clg.
			<u> </u>	

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 636

Building Name: Brigade Head Quarters

EMC No. 1406-011

Prepared by: DMS

Date: 2/18/96

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INTE	RIOR EQUIP	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wali					
Direction (N,			•	1	
E, W, or S)	Item No.	No. of Items	Comments	ltem No.	Description
2, 11, 0. 0,					Architectural
N	A-4	7		A-I	Interior Partitions
N	E-3	3		A-2	Wall Placards
N	M-2	1		A-3	Drapery Valances
	M-6	 		A-4	Drapery Rods, Venician Blinds
		·		A-5	Shelves
	M-5	7		A-6	Closet Door
E	E-2	3		-	
E	A-5	1	2 LF Wood shelf		
E	P-4	1		1	Plumbing
E	A-4	30		P-I	Sinks
	A-T			P-2	Commodes
s	M-5	2		P-3	Toilet Stalls
S	E-2	4		P-4	Slop Sink
S	P-3	2		1	HYAC Mechanical
S	A-4	10		M-I	Floor Supply/Return Grilles
3		ļ		M-2	Ceiling Supply/Return Grilles
w	M-5	10		M-3	Finned-Tube Baseboard Radiators
W	C-3	1		M-4	Thermostats / Space Temp. Sensors
W	E-2	4		M-5	Fan Coil Unit
W	F-4	1		M-6	
W	A-4	33		-	
VV	A-4		GENERAL: Furnished 35'x20' conference		Electrical
			room in basement - 3'-0" high paneling	E-1	Electrical Panels
		<u> </u>	Toom in basement of a ring is particular	E-2	Electrical Outlets
		ļ.———		E-3	Electrical Light Switches
				E-4	Wall Mounted Television
		-			
	<u> </u>				
					Lighting
	<u> </u>			- 	Wall Mounted Fixtures
		1		L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
	.,,			_	
					Fire Protection
				F-I	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
				_	
				_	Communication
	<u> </u>	-		C-1	Telephones - Wall Mounted
	ļ	<u> </u>		C-2	Telephones - Booth Mounted
<u> </u>		-		- (-3	Telephone Jacks
	ļ				
 	<u> </u>	 		_	
	<u> </u>	1		_!	

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

636

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS

AJN

DT:

CHECKED BY: FILE: 636FC1

	AIR HANDLING UNIT	SURVEY OBSERVATION	S
FC-1	AHU NO.	1ST & 2ND FLOORS	LOCATION (RM)
CH-1	REF. SYS. SERVING AHU	ALL	SERVES AREA

			UNIT TYP	E:		
SINGLE ZN	х	2-PIPE FC	4-PIPE FC	UNIT HTR	H&V	
MULTIZONE		DOUBLE DT	REHEAT	INDUCTION	VAV	
NUMBER OF Z	ONES		OTHER			
COMMENT:						

					NAMEPL	.ATE:				
HERMAN I	NELSON				MFG.	N	/AGING4041-6	0		MODEL
3.8	SUPPLY FAN	HP			MFG.					MODEL
0.0	RET/EXH FAN	HP			MFG.					MODEL
13450	CFM-HTG	13450	CFM-CLG	15%	MIN %OA	100%	MAX %OA	70.0%	% HTG AREA	SERVED
COMMENT	·	TOTAL CF	M FOR ALL FAN	COILS; T	NO-PIPE FAN C	OIL IN EAC	H ROOM;			

				COILS:			
×	NONE	sтм		нw	ELEC	MOD VLV	PREHEAT
	NONE	STM	×	нw	ELEC	MOD VLV	HEATING
×	NONE	STM		нw	ELEC	MOD VLV	REHEAT
×	NONE	STM		нw	EVAP MEDIA	MOD VLV	HUMID.
	NONE	DX	×	cw		MOD VLV	COOLING

		C	PERATI	ON:					
HOURS ON:	s	М	т	w	Т	F	S	COMMENTS	
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400		
REQUIRED START TIME									
REQUIRED STOP TIME								<u> </u>	
MONTHS ON:								.	
J F M	Α	М	J	J	A	s	0	N	D
1 1 1	1	1	1	1	1	1	1	1	1

				CONTROLS	:	-	
		PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:	х	SINGLE STPT		DUAL SETPNT	SETBACK		
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT	OCC COOL	UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK	MIXED AIR	OTHER	
DAMPER CONTROL:	Y	MIN OA (Y/N)	Y	MAX OA (Y/N)	RA (Y/N)	EA (Y/N)	<u> </u>
	· · · ·	MA CONTROL		ECONO-DB	ECONO-ENT	OTHER	
DEMAND LIMIT:		YES	N	NO			
COMMENTS:	CONTRO	LS: LOW, MED, HI	GH, ON	/OFF			

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY:

NLA

<u></u>	BLDG:	636	FILE:	636UH1							
	AIR HANDLING UNIT SURVEY OBSERVATIONS										
UH-1	UH-1 AHU NO. BASEMENT LOCATION (RM)										
CV-1	REF. SYS. SERVING AHU		BASEMENT	SERVES AREA							

			UNIT TYP	E:		
 SINGLE ZN	X	2-PIPE FC	4-PIPE FC	UNIT HTR	H&V	
 MULTIZONE		DOUBLE DT	REHEAT	INDUCTION	VAV	
NUMBER OF ZONE	s		OTHER			
COMMENT:						

					NAMEPL	ATE:					
OILS - HO	RIZONTAL				MFG.			*******			MODEL
0.5	SUPPLY FAN HP				MFG.						MODEL
	RET/EXH FAN HP				MFG.						MODEL
2200	CFM-HTG	0	CFM-CLG	0%	MIN %OA	0%	MAX	%OA	30%	% HTG ARI	A SERVED

			COILS:			
NONE	sтм		нw	ELEC	MOD VLV	PREHEAT
NONE	FUEL OIL	х	нw	ELEC	MOD VLV	HEATING
NONE	STM		HW	ELEC	MOD VLV	REHEAT
NONE	STM		нw	EVAP MEDIA	MOD VLV	HUMID.
NONE	DX		cw		MOD VLV	COOLING

					OPERAT	ION:					
HOURS (ON:		S	М	т	w	Т	F	S	COMMENTS	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	S ON:										
J	F	M	Α	M	J	J	Α	s	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

			CONTROLS	3:		
	PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:	SINGLE STPT		DUAL SETPNT	SETBACK		
SPACE SETPOINT (°F):	OCC HEAT		UNOCC HEAT	OCC COOL	UNOCC COOL	
OTHER SETPOINTS (°F):	HOT DECK		COLD DECK	MIXED AIR	OTHER	
DAMPER CONTROL:	MIN OA (Y/N)		MAX OA (Y/N)	RA (Y/N)	EA (Y/N)	
	MA CONTROL		ECONO-DB	ECONO-ENT	OTHER	
DEMAND LIMIT:	YES		NO			
COMMENTS:			***			

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

636

EMC NO.: 1406-011

636CV1

DATE:

FILE:

Feb-96

PREPARED BY: CHECKED BY: DMS

AJN

	BOILER & CONVERTER SURVEY OBSERVATIONS										
CV-1	BOILER/CONVERTER NO.	MECH. RM.	LOCATION (RM)								
C.P.	SOURCE OF HEATING (PLANT)	ALL	SERVES AREA								

UNIT TYPE:										
	STEAM	PSIG	HW	TEMP.	BOILER TYPE:					
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:					
х	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:					
	SPACE HEAT	DHW	OTHER		USE:					
COMMEN	NT:			0%	% HTG AREA SERVED					
			BB RADIATION ONLY							

IO NAME PLATE	MFG.	MODEL	520600	CAPACITY OUTPUT (B	ruh)
			520600	CAPACITY INPUT (BTU	H)
	MFG.	MODEL		CAPACITY OUTPUT (B	ruh)
				CAPACITY INPUT (BTU	H)
5 DTW PUN	MP 1 - HP BELL & GOSSETT	MFG.	1-1/2 8C		MODEL
HW PUMI	P 2 - HP	MFG.			MODEL
HW PUMI	HW PUMP 3 · HP MFG.				MODEL

					OPERAT	ION:					
HOURS (ON:		S	М	Т	w	Т	F	s	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES, NO PINS	
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	ON:										
J	F	М	Α	М	J	J	Α	s	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

CONTROLS:										
	х	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS				
SETPOINTS		PSIG	HW SUPPLY							
RESET CONTROL (oF):		HW HIGH	HW LOW	OA LOW	OA HIGH					
BURNER CONTROLS		O2 TRIM (Y/N)	OTHER							
COMMENTS:	2 BARBE	R COLMAN ELEC./PNE	UMATIC TRANSDUCERS,							
HAS O.A	TEMPERA	TURE RESET		•						

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

636

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96

CHECKED BY:

DMS

AJN

	BLDG:	636	FILE:	636CH1							
REFR	REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS										
CH-1	CH-1 CHILLER/COMPRESSOR NO. OUTSIDE BLDG LOCATION										

	-		UNIT T	YPE:			
	CENTRIFUGAL	WITH WATER SIDE COOL	ING TOWER	1	OTHER	20.0	
	RECIPROCATIN	IG WITH WATER SIDE CO	OLING TOWER	x	AHU'S SERVED	FC-1	·
X	RECIPROCATIN	G WITH AIR COOLED CO	NDENSING UNIT				
	ABSORBTION V	VITH WATER SIDE COOLI	NG TOWER	†			
	AIR COOLED C	ONDENSING UNIT		1			
х	CHW	DX	OTHER	 			

208 VO	TSI	1450									
208 VO	CHILLER TSI MFG. 30AOCS35				MODEL	8-90-A2142	· · · · · · · · · · · · · · · · · · ·	SERIAL NO.			
	DLTS		112	AMPS	3	РН	60	HZ	30	CAPACITY (TO	
CONDENSER F	FANS	MFG.					MODEL		····		# OF FANS
208 VO	DLTS		4.6	AMPS	3	PH	60	HZ	1	НР	
DTW PUMP		MFG.		NO NAME PLATE		MODEL			L	SERIAL NO.	
208 VO	DLTS		5.4	AMPS	3	РН	60	HZ	1.5	r	DEMINE NO.
ONW PUMP		MFG.					MODEL			L	SERIAL NO.
vo	DLTS			AMPS		PH		HZ	T .	HP	DETITAL ITO.

				(OPERATI	ON:						_
HOURS O	N:		S	М	т	w	Т	F	s	COMMENT	······································	
PRESENT ST	ART TIME		0	0	0	0	0	0	0	TIMECLOCK?		
PRESENT ST	OP TIME		2400	2400	2400	2400	2400	2400		NO TIMECLO	.K	
REQUIRED S	TART TIME								2.00	110 111120200		
REQUIRED S	TOP TIME											
MONTHS	ON:						···			L		
J	F	М	A	М	J	J	Α	s	0	N	D	
0	0	0	0	1	1	1	1	1	0	. 0		

			CONTROL	S:		
	PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	CWS (oF)		CWR (oF)	CNWS (oF)	CNWR (oF)	
PANEL INDICATORS						
- PRESSURE	LITE-HI		LITE-LOW	GAUGES		
- TEMPERATURE	LITE-HI		LITE-LOW	GAUGES		
- OTHER						
COMMENTS: FA	M RADIO CONTROL					

ANNUAL ENERGY SAVINGS SUMMARY FOR CHAPEL's - BUILDINGS 637, 742, & 843

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
637	171.30	135.33	35.97	42.00	39.30	2.70	1246.79	1017.34	229.45

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 637	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
742	8,949	8,949	1.000	35.97	35.97	2.70	2.70	229.45	229.45
843	8,890	8,949	0.993	35.97	35.74	2.70	2.68	229.45	227.94

^{*}Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak			Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
637	171.30	134.06	37.24	42.00	39.20	2.80	1246.79	1014.03	232.76

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 637	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
742	8,949	8,949	1.000	37.24	37.24	2.80	2.80	232.76	232.76
843	8,890	8,949	0.993	37.24	36.99	2.80	2.78	232.76	231.23

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR CHAPEL's - BUILDINGS 637, 742, & 843

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
637	\$59,688

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 637	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
742	8,949	8,949	1.000	\$59,688	\$59,688
843	8,890	8,949	0.993	\$59,688	\$59,295

^{*}Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
637	\$63,708

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 637	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
. 742	8,949	8,949	1.000	\$63,708	\$63,708
843	8,890	8,949	0.993	\$63,708	\$63,288

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

		LOCATION:	Fort Leonard	Wood	REGION: 2 (Missour	ri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Energ	gy Study, Insu	late Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INV	ESTMENT:	BLDG 637 - I	NSTALL 3.5"	FIBERGLASS BATT	INSULATION ON V	VALLS	
	A.	CONSTRUCTION COS	Т	. =			\$52,821	
	В.	SIOH COST	{7 .	0% of 1A) =			\$3,698	
	C.	DESIGN COST	(6.	0% of 1A) =			\$3,169	
	D.	TOTAL COST	(1A ·	+1B +1C) =			\$59,688	
	E.	SALVAGE VALUE OF	EXISTING EQ	UIPMENT =			\$O	
	F.	PUBLIC UTILITY COM	PANY REBATI	=			\$0	
	G.	TOTAL INVESTMENT	(1	D -1E -1F) =			>	\$59,688
^	ENIE	DOV CAMBIOC (.) OD	COST ()					
۷.		RGY SAVINGS (+) OR TE OF NISTIR 85-3273-		R DISCOUNT I	FACTORS:	JAN '96		
	<i>UA</i> 1	ENERGY	FUEL COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
		SOURCE		MBTU/YR (2)	SAVINGS (3)	FACTOR (4)		
	Δ	ELECT.	\$7.33	35.97	\$263	13.80		
	В.	DIST	\$0.00	0	\$0	0.00	•	
		NAT GAS	\$5.30	229.45	\$1,216	17.76		
		COAL	\$0.00	0	\$0	0.00		
		ELEC. DEMAND	,		\$200	13.47		
	F.	TOTAL		265.42	\$1,680		>	\$27,933
3.		N-ENERGY SAVINGS (+)				
		1 ANNUAL MAINTEN	ANCE		\$0		\$0	
		2			\$0		\$0	
		3			\$0		\$O	
		4 TOTAL ANNUAL DI	SC. SAVINGS	(+)/COST	\$0		\$O	
	В.	NON-RECURRING (+/-	١					
	υ.	ITEM		SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
		I I LIVI		COST(-) (1)	OCCURRENCE (2)		SAVINGS/COST (4)	
				000.(7(17	0000111121102 (2)	(TABLE A-2)		
		a. BASELINE EQUIP. RI	EPLCMNT.				\$ 0	
		b.	•				\$0	
		c.					\$O	
		d.					\$ 0	
		e.					\$O	
		f. TOTAL		\$0			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+) OR COST (-)	(3A4 + 3Bf4) =		\$0
			NOO 1 1 1 2 2	OTO ::		000 - 044 - 10011		44 000
		ST YEAR DOLLAR SAVI			•	2F3 + 3A4 + (3Bf1/E	conomic Lite))	\$1,680 25.52
		PLE PAYBACK (SPB) IN		DIRE < 10 A	EARS TO QUALIFY)			35.53
		AL NET DISCOUNTED		T DATIO (010)		(2F5 + 3C) =		\$27,933
1.	טוס(COUNTED SAVINGS-TO)	(6/1G) =		0.47
		(MUST HAVE SIR > 1	.25 TO QUAL	.17 1 /				

ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	1	Ğ	-
PROJECT	_	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woo	od, MO			DATE PREPARED	EPARED	Ι'	18-Feb-96
ENGINEER	<u>~</u>	E M C Engineers, Inc.					ESTIMATOR	JR		D. Sinz
		Denver, CO					CHECKED BY) BY	A.N	A. Niemeyer
- - -	Item Defer		:	MA	MATERIAL COST	ST	-	ABOR COST		
Š .	Code		Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/	1042	TOTAL
_		BUILDING 637						5	Otal	20.7
2		INSTALL 3.5" BATT INSULATION ON WALLS								
٥ 4										
2	13-1/21	INSTALL 3-1/2" BATT INSULATION	S	8300 0	\$0.18	\$1 504	0000	2000	9.4	000
9	٥	INSTALL 1/2" DRYWALL - TAPED & SANDED	SF	7928.0	\$0.20	84.788	2.CADD	0.007	070'14	\$3,031
۲ .	NSI.	INSTALL 2"x4" STUDDED WALL 2' OC	Ę.	4311.0	\$0.24	\$1,016	F-2	0.00	\$2.138	\$3,070
ο (- C	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	8300.0	\$0.07	\$554	1-PORD	0.01	\$2,003	\$2.558
ב ה	77.00	RELOCATE FAN COIL UNIT	Ä	16.0	\$20.30	\$325	Q-6	5.67	\$7,935	\$8,260
2 7	763	RELOCATE BAI HROOM SINK	EA.	1.0	\$17.58	\$18	<u>ç</u>	7.35	\$414	\$432
- 2	202		Ä.	24.0	\$0.00	\$0	L-2	0.744	\$829	\$829
13 6	אבר אברי	BELOCATE ELECTRICAL LIGHT SWITCH	ď i	2.0	\$8.82	\$18	1-ELEC	0.844	\$51	69\$
14	BESAG	įč	. E	4.0	\$7.97	\$32	1-ELEC	0.896	\$109	\$141
4	5 2	RELOCATE PECANED	!	12.0	\$3.82	\$46	1-SHEE	1.69	609\$	\$654
9	SWC.	RELOCATE WALL CABINET	i R	4.0	\$0.00	\$0	1-ELEC	1.5	\$183	\$183
17	Id/Wa	REI OCATE WALL ORBINE!	L L	1.0	\$0.00	\$0	1-CARP	1.7	\$45	\$45
<u>«</u>	RWTC	RELOCATE WALE FLACARD	Z C	12.0	\$0.00	\$0	1-CARP	0.654	\$206	\$206
6	IWB-1/2	Č	EA.	2.0	\$35.83	\$72	0-5	10.904	\$1,911	\$1,983
20	IWB-5/8	INSTALL 1/2 WAIENTRI BRU - LAPED & SANDE	ν c	138.0	\$0.84	\$116	2-CARP	0.02	\$145	\$261
2	D LO	INSTALL CEDAMIC THE 4 4/4" . 4 4/4" THE	. T.	96.0	\$0.96	\$92	2-CARP	0.02	\$101	\$193
22		1.40 1.41 1.4 X 4-1/4 1.LE	.т. .т.	3/2.0	\$1.83	\$681	2-TILE	0.084	\$1,513	\$2,195
23										
24					:					
25										
- 207		T T T T T T T T T T T T T T T T T T T		1	i					
75	טוני		:		:	\$6,061			\$26,801	\$32,862
20		DIFFICULILY FACIOR			2%				\$1,340	\$1,340
30		SUBJUTAN		:	:	\$6,061			\$28,141	\$34,202
3.5		OVERHEAD		:	17%	\$1,030			\$4,784	\$5,814
- C	Caa	SUBJUINE				\$7,092			\$32,925	\$40,016
33		SIBTOTAL			10%	\$209			\$3,292	\$4,002
34	TNCC	CONTINCENCY				\$7,801			\$36,217	\$44,018
32	_0 ∷_	15			50%	\$1,560			\$7,243	\$8,804
						\$9,361			\$43,461	\$52,821

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) LOCATION: Fort Leonard Wood REGION: 2 (Missouri) PROJECT NO: 1406-011 PROJECT TITLE: Limited Energy Study, Insulate Brick Buildings FISCAL YEAR: 1996 ANALYSIS DATE: 02/20/96 **ECONOMIC LIFE:** 20 PREPARED BY: D. Sinz BLDG 637 - INSTALL 1.5" RIGID INSULATION ON WALLS 1. INVESTMENT: A. CONSTRUCTION COST \$56,379 SIOH COST (7.0% of 1A) =\$3,947 C. DESIGN COST (6.0% of 1A) =\$3,383 D. TOTAL COST (1A + 1B + 1C) =\$63,708 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 PUBLIC UTILITY COMPANY REBATE = \$0 G. TOTAL INVESTMENT \$63,708 (1D - 1E - 1F) =----> 2. ENERGY SAVINGS (+) OR COST (-): DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: **JAN '96 ENERGY FUEL COST SAVINGS** ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 37.24 \$273 13.80 \$3,764 DIST \$0.00 0 \$0 0.00 \$0 C. NAT GAS 17.76 \$21,909 \$5.30 232.76 \$1,234 D. COAL \$0.00 \$0 0.00 \$0 E. ELEC. DEMAND \$208 13.47 \$2,799 F. TOTAL 270.00 \$1,714 ----> \$28,473 3. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE 14.88 \$0 ŝΩ 2 14.88 \$0 \$0 3 \$O 14.88 ŝO 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 \$0 B. NON-RECURRING (+/-) **ITEM** YEAR OF DISCOUNT SAVINGS (+) DISCOUNTED COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$0 5 \$0 \$0 b. \$0 c. \$0 d. \$0 f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) =\$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$1,714 SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) =37.16 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) =\$28,473 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) =0.45

LIFE CYCLE COST ANALYSIS SUMMARY

(MUST HAVE SIR > 1.25 TO QUALIFY)

ENGIN	EER'S OI	ENGINEER'S OPINION OF PROBABLE COST					SHEET	-	PO	-
PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woo	od, MO			DATE PREPARED	PARED	18-F	18-Feb-96
ENGINEER	Z.	E M C Engineers, Inc.			-		ESTIMATOR	JR	D.	Sinz
		Denver, CO					СНЕСКЕВ ВУ	ВҮ		A. Niemeyer
				MA	MATERIAL COST	ST	J – I	ABOR COS	_	
Line No.	Item Refer Code	Item Description	Unit of Measure	Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-		BUILDING 637								
2		INSTALL 1.5" RIGID INSULATION ON WALLS	:	1	-					
က										
4						!				
5	11-1/2RI		S.F.	8300.0	\$0.59	\$4,909	1-CARP	0.008	\$1,745	\$6,654
9	Q	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	7928.0	\$0.20	\$1,588	2-CARP	0.017	\$7,082	\$8,670
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	<u>ب</u>	3054.0	\$0.19	\$583	1-CARP	0.016	\$1,284	\$1,866
æ	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S. T.	8300.0	\$0.07	\$554	1-PORD	0.01	\$2,003	\$2,558
တ	RFCU	RELOCATE FAN COIL UNIT	Ë	16.0	\$20.30	\$325	Q-6	2.67	\$7,935	\$8,260
9	RBS	RELOCATE BATHROOM SINK	E.	1.0	\$17.58	\$18	Q-1	7.35	\$414	\$432
Ξ	RDR		Ë	24.0	\$0.00	\$ 0	L-2	0.744	\$829	\$829
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	Ë	2.0	\$8.82	\$18	1-ELEC	0.844	\$51	\$69
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	4.0	\$7.97	\$32	1-ELEC	968.0	\$109	\$141
4	RFSAG	RELOCATE FLOOR SUPPLY AIR GRILLES	EĄ.	12.0	\$3.82	\$46	1-SHEE	1.69	609\$	\$654
15	RS	RELOCATE SPEAKER	EĄ.	4.0	\$0.00	\$0	1-ELEC	1.5	\$183	\$183
16	RWC	RELOCATE WALL CABINET	EĀ.	1.0	\$0.00	\$0	1-CARP	1.7	\$45	\$45
17	RWPL	RELOCATE WALL PLACARD	Ë	12.0	\$0.00	\$0	1-CARP	0.654	\$206	\$206
18	RWTC	RELOCATE WATER CLOSET	E.	2.0	\$35.83	\$72	Q-2	10.904	\$1,911	\$1,983
19	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	138.0	\$0.84	\$116	2-CARP	0.02	\$145	\$261
20	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	96.0	\$0.96	\$92	2-CARP	0.02	\$101	\$193
21	בו	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	372.0	\$1.83	\$681	2-TILE	0.084	\$1,513	\$2,195
55			1	1		THE THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON AND ADDRESS OF THE PERSON ADDRESS OF TH				
33										
24 25										
92										
27		SUBTOTAL	:	1		\$9,033			\$26,164	\$35,197
28	DIFF	DIFFICULTLY FACTOR	!		2%	:			\$1,308	\$1,308
29		SUBTOTAL	1			\$9,033			\$27,473	\$36,506
30	ᆼ	OVERHEAD			17%	\$1,536			\$4,670	\$6,206
34		SUBTOTAL		:		\$10,569		- P	\$32,143	\$42,711
32	PRO	PROFIT		:	10%	\$1,057			\$3,214	\$4,271
33		SUBTOTAL				\$11,625			\$35,357	\$46,983
34	CONT	CONTINGENCY			50%	\$2,325			\$7,071	\$9,397
35	TOTAL CC	COST				\$13,950			\$42,429	\$56,379

						····	
E M C ENGINEERS,	INC.					DATE:	Feb-96
PROJECT: LIMITED ENERGY S	TUDY, INSULATE BI	RICK BUILI	DINGS			BY:	DMS
CLIENT CONTRACT NO.: DACA	01-94D-0033					JOB:	1406.011
LOCATION: FT LEONARD WO	D MO					CHK:	AJN
LUCATION: FI LEGNARD WOO	JD, IVIO.					-	637Z1BHL
						FILE:	63/Z I BHL
BUILD	NG HEATING L	OAD C	ALCULA	TION SHEE	Т		
BLDG NO: 637 BLDG FUNCTION:		CHAPEL -	ZONE 1				
FLOOR AREA: (SQ. FT)	CHAPEL AREA 4,647					# FLOORS	1
SLAB PERIMETER: (FT)	300					# 1200Nb	
I. AREAS: ([] FIELD VERIFIED	ELEVATION PLANS		COUTU		14/507	TOTAL 1	
WALLS CROSS	(CO_FT)	NORTH	2,369	EAST 1 450	WEST	TOTAL 7,107	
WALLS, GROSS GLASS	(SQ. FT) (SQ. FT)	1,822 253	486	1,458 94	1,458	833	
PERSONNEL DOOR	(SQ. FT)	21	21	41	0	82	
OVERHEAD DOOR	(SQ. FT)	0	0	0	0	0	
WALLS, NET	(SQ. FT)	1,548	1,862	1,323	1,458	6,192	
ROOF AREA (OR CEILING AREA	IF ATTIC IS UNCO	NDITIONE	D)		(SQ. FT)	5,313	
OVERHEAD DOOR	(SQ. FT)		PERSONN		(SQ. FT)	82	
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0	
II. CONSTRUCTION: ([] FIELD		ROOF, WIN	DOW, DO				
WALLS: (SKETCH CROSS SEC	TION OF WALL)				OMPONEN		R-VALUE
					OUTSIDE		0.17
					4" FACE I		0.43
					12" CMU	Ε	3.03
				5.	12 01010		0.00
				6.			
				7.	INSIDE AI	R FILM	0.68
						R-WALL =	5.22
						U = 1/R	0.191
ROOF: (SKETCH CROSS SECT	ON OF BOOF				MPONEN	TC	R-VALUE
ROOF: (SKETCH CROSS SECTI	ON OF ROOF)				OUTSIDE		0.17
						TE SHINGLES	0.44
				3.	.375" FEL	T MEMBRANE	0.29
						SHEATHING	0.47
						INSULATION	4.00
					WOOD DE		4.76
				/.	INSIDE AI	R-ROOF =	0.68 10.81
					TOTAL	U = 1/R	0.093
	.					,	
GLASS TYPE:	PPG 'PENNVERNO	ON' C.L. T	WNDV, SS	A, .88 S.C.		R-GLASS	1.61
SLAB TYPE FLOOR:	CEMENT					SLF	0.67
BASEMENT TYPE:	NONE					R-BASEM.	0.00
OVERHEAD DOOR TYPE:	NONE	H 900/ 5**	UCLE OLAS	`C		R-ODOOR	0.00
PERSONNEL DOOR TYPE:	2" RED OAK WIT	n 60% SII	VOLE GLAS			R-PDOOR	1.06
III. INFILTRATION:					0.000		
TIGHT WALL H/M/L (SQ.FT.)	Н	7107	X CFM /		0.083	=	590
AVG. WALL H/M/L (SQ.FT.) LEAKY WALL H/M/L (SQ.FT.)			X CFM /		0.000	=	0
DOOR OPENINGS / HR - SINGLE	DOOR			OPENING /HR	1.600	=	
DOOR OPENINGS / HR - DOUBL		10		OPENING /HR	1.385	=	14
				ILTRATION (C		=	604
TIA ODGOD	ODOOD AREA			Y DOOR "II"	0.000		
UA ODOOR UA PDOOR	ODOOR AREA PDOOR AREA	0 82		X DOOR "U"	0.000	=	0 78
UA WALL	WALL AREA	6,192		X WALL "U"	0.191	=	1,185
UA ROOF	ROOF AREA	5,313		X ROOF "U"	0.093	=	492
UA GLASS	GLASS AREA	833		X GLASS "U"	0.621	=	517
UA SLAB	SLAB PERIM.	300		X SLF	0.670	=	201
UA BASEM.	B-WALL AREA	0		X BASE. "U"	0.000	=	0
INFILTRATION	CFM	604		X A. T. F.	1.035	=	625
		-		TOTAL UA (BT	'U/HR°F)		3,098

E M C ENCINEEDS	INIC		~~~				
E M C ENGINEERS,						DATE:	Feb-96
PROJECT: LIMITED ENERGY	•	RICK BUILI	DINGS			BY:_	DMS
CLIENT CONTRACT NO.: DAC	A 01-94D-0033					JOB: _	1406.011
LOCATION: FT LEONARD WO	OD, MO.					CHK:	NLA
						FILE:	637Z2BHL
BUILD	ING HEATING	LOAD C	ALCULA	TION SHEE	ĒΤ		:
BLDG NO: 637	BLDG NAME:	CHAPEL -	70NE 2				
BLDG FUNCTION:	OFFICE AREA	CHAPEL -	ZONE Z				
FLOOR AREA: (SQ. FT)	3,189	_				# FLOORS	1
SLAB PERIMETER: (FT)	219	-				_	
I. AREAS: ([] FIELD VERIFIE	D ELEVATION PLAN	S)					
WALLS 02000		NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS GLASS	(SQ. FT)	358	0	1,002	971	2,331	
PERSONNEL DOOR	(SQ. FT) (SQ. FT)	0	0	106 74	42	148 74	
INSULATED PANEL	(SQ. FT)	0	0	0	0	74	
WALLS, NET	(SQ. FT)	358	Ō	822	929	2,108	
ROOF AREA (OR CEILING ARE					(SQ. FT)	3,189	
INSULATED PANEL BASEMENT WALLS	(SQ. FT) (SQ. FT)	0	PERSONNI		(SQ. FT)	74	
			0	0	0	0	
II. CONSTRUCTION: ([] FIEL WALLS: (SKETCH CROSS SEC		ROOF, WIN	DOW, DOO		OMBONIEN	те Т	D.VALUE
THE TOTAL TOTAL OR OLD SEC	OIT OI TYALL)				OMPONEN OUTSIDE		R-VALUE 0.17
					4" FACE		0.17
·				3.	AIR SPAC	E	0.91
					6" CMU		1.89
				5. 6.			
					INSIDE AI	R FILM	0.68
						R-WALL =	4.08
						U = 1/R	0.245
ROOF: (SKETCH CROSS SECT	ION OF ROOF)				OMPONEN	TC	R-VALUE
					OUTSIDE		0.17
				2.	SHINGLES	S/FELT/DECK	0.96
					CEILING A		1.00
					3" FB BA1	LOSE INSUL	10.00
						UM BOARD	0.45
				7.	INSIDE AI		0.68
					TOTAL F	R-ROOF = U = 1/R	24.26
						U= 1/K	0.041
GLASS TYPE:	PPG 'PENNVERN	ON' C.L. T	WNDV, SS.	A, .88 S.C.		R-GLASS	1.61
SLAB TYPE FLOOR: BASEMENT TYPE:	CEMENT					SLF	0.83
INSULATED PANEL:	NONE		· · · · · · · · · · · · · · · · · · ·			R-BASEM. R-PANEL	0.00
PERSONNEL DOOR TYPE:	METAL					R-PANEL R-PDOOR	4.20 2.56
III. INFILTRATION:							
TIGHT WALL H/M/L (SQ.FT.)			X CFM /	SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)	L	2258	X CFM /	SQ.FT.	0.092	=	208
LEAKY WALL H/M/L (SQ.FT.)	E DOOR		X CFM /		0.000	=	0
DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBLE		5		OPENING /HR OPENING /HR	1.600 1.385	=	0 7
2. 2. 2 DOOD!				ILTRATION (CI		=	215
UA PANEL	PANEL AREA	0					
UA PDOOR	PDOOR AREA	74		X PANEL "U" X DOOR "U"	0.238	=	29
UA WALL	WALL AREA	2,108	·········	X WALL "U"	0.245	=	516
UA ROOF	ROOF AREA	3,189		X ROOF "U"	0.041	=	131
UA GLASS	GLASS AREA	148		X GLASS "U"	0.621	=	92
UA SLAB UA BASEM.	SLAB PERIM. B-WALL AREA	219 0		X SLF X BASE. "U"	0.830	=	182
INFILTRATION	CFM	215		X A. T. F.	0.000 1.035	=======================================	222
			1,	***			
			<u>1</u>	TOTAL UA (BT	U/RK*F)		1,173

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033

LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

PREPARED BY CHECKED BY:

DMS AJN

FILE: BLDG: 637Z1 637

1

ZONE:

R	lates o	f Heat	Gain from Occupants of C	Conditioned Space	es			
Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	100	1	Seated at rest	Theater, Movie	225	105	22,500	10,500
TOTAL	100					TOTAL	22,500	10,500

			Peak Wattage Value for Light		
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	10		Incandescent - 750w	750	7,500
	4		Incandescent - 200w	200	800
	6	21	Incandescent - 150w	150	900
	7	18	Incandescent - 60w	60	420
TOTAL	27			TOTAL	9,620

	, ,		Peak Value for Internal C	Gains			
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)
1	1	0	Church Organ	1,150	15%	1,150	3,925
				TOTAL	15%	1,150	3,92

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

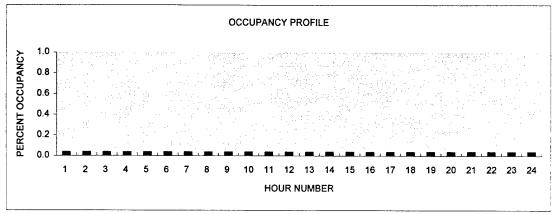
EMC NO.: 1406-011 DATE: PREPARED BY: DMS

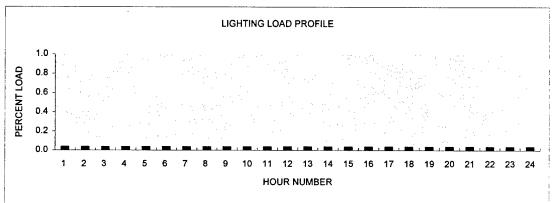
26-Jan-96 AJN

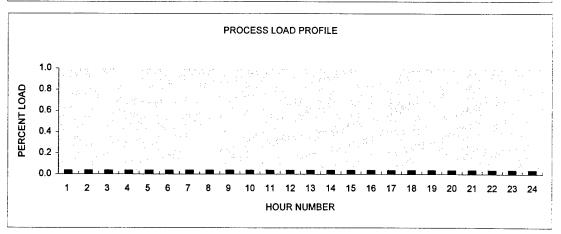
CHECKED BY:

FILE;	63/21
BLDG:	637
ZONE:	1

BLDG	BLDG	TYPE OF										HOUF	RNU	MBER												
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	Church	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0







PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE: PREPARED 26-Jan-96

CHECKED B

DMS AJN

FILE: BLDG: 637Z2 637

ZONE:

F	Rates o	f Heat	Gain from Occupants of C	Conditioned Space	es			
Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
2	5	2	Seated very light work (writing)	Offices, hotels, a	245	155	1,225	775
TOTAL	5					TOTAL	1,225	775

			Peak Wattage Value for Light		
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
2	35	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4	84	2,940
	15	18	Incandescent - 60w	60	900
			0	0	0
i i			0	0	0
TOTAL	50			TOTAL	3,840

Peak Value for Internal Gains												
Zone	No. of	Equip.			Heat Gain	I	Total					
No.	Equipmen	Type	Description	Average Wattage	to Space(%)	Total Wattage	(BTU)					
2	1	55	Refrigerator/Freezer	326	15%	326	1,113					
	1	62	Television (Color, tube)	300	15%	300	1,024					
	1		Coffee Maker	1,500	30%	1,500	5,120					
	1		Microwave Oven	600	65%	600	2,048					
	1		Range with Oven	10,262	80%	10,262	35,024					
	5	5	Printer (laser)	870	34%	4,350	14,847					
	5	8	Terminal	145	90%	725	2,474					
							·					
1				TOTAL	63%	18,063	61,649					

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN

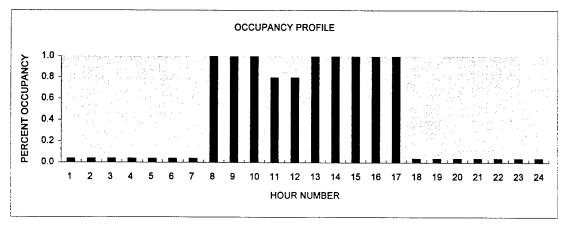
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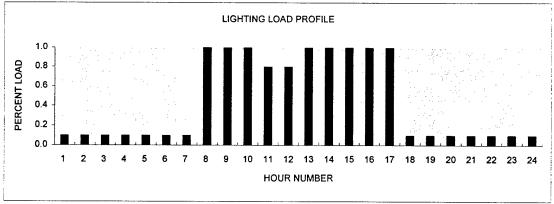
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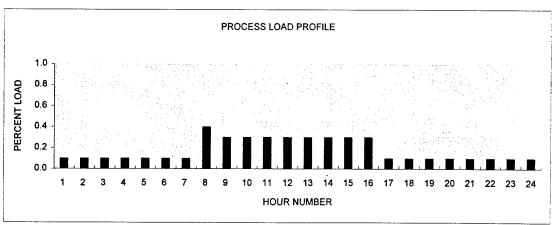
BLDG: ZONE:

637 2

BLDG	BLDG	TYPE OF		HOUR NUMBER																						
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
8	Church	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	0.8	0.8	1.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	8.0	0.8	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1







```
BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.900000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995
                YEAR 1955
SITE LATITUDE DEG (AL1)
                               37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                               1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                   70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 127093.000000
FLOOR AREA (SQFT) 4647.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 475000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -360000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 46470.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 604.000000
INFILTRATION PROFILE

    1.00
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A FACTOR IN INFILTRATION EQUATION (CINA) 2.850000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 4250.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 201.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 78.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 1.000000
                                   WALL DATA
                                             2
WALL NUMBER
                                   1
                                                        3
AZIMUTH ANGLE (AZ)
                                  .00 90.00 180.00 -90.00
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
                                1862.0 1458.0 1548.0 1323.0
WINDOW AREA SQFT (AWND) 486.0 .0 253.0 94.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 48.6 .0 25.3 9.4 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 CO
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MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120 0	120 0	120.0
MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	.191	191	120.0	120.0
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB BN FACTORS BN (BN) N=1 N=2 N=3 N=4 N=5	.00155	.00155	.00155	00155
NUMBER OF BN FACTORS (NB	6	6	6	.00155
BN FACTORS BN (BN)		•	Ŭ	Ü
N=1	.00000	.00000	00000	00000
N=2	.00000	.00000	00000	00000
N=3	.00015	.00015	.00015	00015
N=4	.00064	.00064	.00064	00013
N=5	.00060	.00060	.00060	.00060
N=6	.00015	.00015	.00015	-00015
N=6 NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4 N=5	1.00000	1.00000	1.00000	1.00000
N=2	-2.48050	-2.48050	-2.48050	-2.48050
N=3	2.22216	2.22216	2.22216	2.22216
N=4	87313	87313	87313	- 87313
N=5	.14299	.14299	.14299	14299
N=6	00853	00853	00853	- 00853
ROOF AREA SQFT (AROF) 5313.	000000			.00055
ROOF U VALUE BTU/HR-SQFT-F (URF	9.30	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YE	S, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	2.1056	61E-03	_	
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .000 .439E-03	.105E-02	.526E-03	.877E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.98 1.34 -	.374	.434E-01	170E-02	
SKYLIGHT TILT DEGREES (TILT)	0.000000E	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	W) 0.00	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	1			
SUMMER START MONTH AND DAY FOR	HSK) O.	000000E+0		
SUMMER END MONTH AND DAY FOR SH	SHSK (MST,	NDST)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	OOOOOT, NE	(עמע	1	1
DAYTIME SKY LIGHT U BTU/SQFT-HR	.000000E+0		202000	
NIGHT TIME SKYLIGHT U BTU/SQFT-H	TD_E (SVIO)	L.2	292998	
FRACTION OF PROCESS HEAT TO INTE	מעט ועועם:	יאי <i>)</i> יים (האים)	1.292998	
THE THE TAX OF THE TOTAL TO THE	SKNAD SPAC	L (PAP)	1.500000E	-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	10.	589.	22500.	10500.		
HOUR	HC	URLY FRACT	TION OF PEA	7K		
1	.040	.040	.040	.040	70.0	75.0
2	.040	.040	.040	.040	70.0	75.0
3	.040	.040	.040	.040	70.0	75.0
4	.040	.040	.040	.040	70.0	75.0
5	.040	.040	.040	.040	70.0	75.0
6	.040	.040	.040	.040	70.0	75.0
7	.040	.040	.040	.040	70.0	75.0
8	.040	.040	.040	.040	70.0	75.0

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70.0
                                  .040
          .040 .040 .040
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                                                           75.0
 11
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 12
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.040 .040
                                                70.0
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 13
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                                                           75.0
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           .040
 14
                                                           75.0
                                                70.0
                   .040
 15
           .040
                                                           75.0
                                                70.0
           .040
                    .040
 16
                                                           75.0
           .040
                                                70.0
 17
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                                                70.0
                                                          75.0
                    .040
 18
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                                                          75.0
                                                70.0
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 19
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 20
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                                                          75.0
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                                                70.0
                                                          75.0
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 22
           .040
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                                                 70.0
                                                          75.0
                                      .040
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                             .040
 23
                                                           75.0
                                                70.0
           .040
                    .040
                             .040
                                      .040
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000 NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN)
                     2
SUPPLY AIR CFM (SACFM)
                     6970.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.00000

THE TEMP(TMXAIR) 55.000000
                               24.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP)
                                     1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 475000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 593750.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                     .400
                                                              .451
.100 .191 .200 .286 .300 .369
                                                       .800
                  .600
                            .625
                                     .700
                                              .718
                                                                .812
.500
          .537
         .906
                  1.00
                           1.00
 .900
CHILLER TYPE (ITYPCH)
                            4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 92151.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .000 .000 .000 .000 .000
                                                       .000
                                                                .000
               .000 .000
 .000
         .000
                                     .000
                                              .000
                                                       .000
                                                                .000
         .000
 .000
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BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITE DOOR AND	4			VENT	
MNT	'H LOAD			ROOF		RSMT	WALL	WINDOW	AND I INFI	
	0.		16.	0.	0.	0.	0.	0.	0.	0.
	-170.						-63.	-11.		
FEB	0.						0.			0.
	-136.	LOSS		-12.	-6.	0.	-51.	-10.	-81.	0.
MAR	1.	GAIN	24.	0.	0.	0.	Ο.	0.	0.	0.
	-104.	LOSS		-10.	-6.	0.	-35.	-9.	-72.	0.
APR	10.31	GAIN	22.32	.06	.05	.00	2.95	.08	.53	1.89
	-44.23	LOSS		-5.69	-3.23	.00	-13.91	-5.09	-38.74	.00
MAY					.15		12.89			
	-8.12	LOSS		-2.63	-1.83	.00	91	-2.79	-19.88	.00
JUN			23.30	.98	.40	.00	25.61	.63	3.85	36.52
	16	LOSS		90	88	.00	.00	-1.33	-8.82	.00
JUL	118.	GAIN LOSS	23.	2.	1.		37.			
				0.		0.	0.	-1.	-6.	0.
AUG	107.	GAIN	21.	2.	1. -1.	0.	31. 0.	1.	7.	
	0.	LUSS								0.
	61.27 -10.23	GAIN LOSS	20.16	.55	.37	.00	16.16	.60	3.96	27.58
	-10.23	LOSS		-2.35	-1.43	.00	-1.17	-2.21	-16.03	.00
	11.03 -41.86	GAIN			.06 -3.05		2.17			
							-13.98			
	1.57		16.39	.00	.01	.00	.00 -33.76	.01	.09	.44
	-87.46									.00
DEC	0.	GAIN	15.	0.	0.	0.	0.	0.	0.	0.
	-170.	LUSS		-14.	-7.	0.	-67.	-11.	-92.	0.
TOT							128.			
	-773.	LOSS		-78.	-42.	0.	-278.	-66.	-523.	0.
MAX	HEATING	LOAD=	-475	5000. BT	ות מס אטי	EC 18	HOUR 7	ΔM¤.	ייי דאי	D _1
MAX	COOLING	LOAD=	350	225. BI	TUH ON SI	EP 2	HOUR 7 HOUR 12	AMB:	IENT TEM	P 91.

ZONE UA BTU/HR-F 2271.1

BEACON Energy Analysis By EMC Engineers, Inc. 637A.I

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

									FAN T	OTAL
INTERN	AL									
		RNAL				COIN-	LIGHTING		HEAT	HEAT GAIN
	TEM	PERAT	URE F			CIDENT	THOUSAND	MILLION	MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	69.	75.		1	13	53.	.23	.09	3.78	5.09
			67.	29	7	14.				
FEB	69.	77.		17	13	59.	.20	.08	3.41	4.57
			67.	6	7	14.				
MAR	70.	78.		12	13	74.	.22	.09	3.78	5.05
			57.	24	19	69.				
APR	72.	78.		25	12	77.	.21	.09	3.66	4.87
			59.	2	19	69.				
MAY	74.	78.		31	12	80.	.23	.09	3.78	5.09
			69.		5					
					_					
JUN	76.	79.		29	12	87.	.21	.09	3.66	4.87
	,		70.			56.				
			,		_					
JUL	76.	79.		5	12	85.	.22	.09	3.78	5.05
	, , ,		72.			65.	,		3.,0	5.05
			,			05.				
AUG	76.	78.		30	12	86.	.23	.09	3.78	5.09
	,	,	70.	26		57.		.05	3.75	3.03
			,	20		57.				
SEP	74.	81.		25	12	63.	.20	.08	3.66	4.83
4 21	,	01.	69.		6		.20		3.00	1.05
			٠,٠	+0	Ū	-3.				
OCT	71.	78.		4	12	83.	.23	.09	3.78	5.09
001	, - •	,	66.	-	20	69.	.23		3.70	3.05
						٠,٠				
NOV	70.	77.		8	13	77.	.22	.09	3.66	4.92
2,00	,		57.	7	18	69.		.05	3.00	,2
			٥,.	,	-0	0,5				
DEC	69.	76.		23	13	71.	.21	.09	3.78	5.01
220			67.		7				5.,0	2.01
			٠,.	-0	,	** *				
YEAR							2.59	1 06	44.48	59.55
TIME							د. ۵	1.00	44.40	ر د . ر د

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF 1	HOURS WHE	MUMIXAM V	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	740	0	0	0	4571E+06	.0000
FEB	663	1	0	0	3941E+06	
MAR	678	43	Ö	-		.0000
APR	492		=	0	3783E+06	.1213E+06
		159	0	0	2244E+06	.1604E+06
MAY	219	400	0	0	1248E+06	.2216E+06
JUN	21	642	0	0	1730E+05	.3155E+06
JUL	0	717	0	0	.0000	.3303E+06
AUG	13	704	0	0	2748E+05	.3082E+06
SEP	206	456	0	o		
OCT	523	152	0	-	1179E+06	.3502E+06
NOV			•	0	2042E+06	.2353E+06
	655	36	0	0	3134E+06	.1335E+06
DEC	741	0	1	0	4750E+06	.0000
YEAR	4951	3310	1	0	4750E+06	.3502E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	232.17	.00	.23	.09	1.11	5.09	1.9
FEB	190.23	.00	.20	.08	1.00	4.57	1.9
MAR	157.43	.14	.22	.09	1.11	5.05	12.0
APR	82.87	. 96	.21	.09	1.07	4.87	14.4
MAY	27.11	2.78	.23	.09	1.11	5.09	19.5
JUN	2.38	7.03	.21	.09	1.07	4.87	26.9
JUL	.00	9.58	.22	.09	1.11	5.05	27.6
AUG	1.47	8.78	.23	.09	1.11	5.09	26.1
SEP	26.42	5.11	.20	.08	1.07	4.83	28.3
OCT	82.79	1.01	.23	.09	1.11	5.09	20.6
NOV	137.99	.16	.22	.09	1.07	4.92	12.8
DEC	231.78	.00	.21	.09	1.11	5.01	1.9
YEAR	1172.64	35.55	2.59	1.06	13.03	59.55	28.3

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 290159. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 637A.I

BLDG 637 - CHAPEL SANCTUARY AREA - ZONE 1 BASELINE

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	OTH AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG.	TEM RIFT	HOUR: SYSTEI	ICS S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.0000	4571E+06
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.0000	3941E+06
MAR	1944.	1269.	1.000	43.	0.	Ο.	0	0	.1213E+06	3783E+06
APR	2323.	1608.	1.000	55.	0.	0.	, 0	0	.1604E+06	2244E+06
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.2216E+06	1248E+06
JUN	2646.	1993.	1.000	72.	0.	Ο.	0	0	.3155E+06	1730E+05
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.3303E+06	.0000
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.3082E+06	2748E+05
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.3502E+06	1179E+06
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.2353E+06	2042E+06
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.1335E+06	3134E+06
DEC	916.	627.	1.000	35.	0.	0.	0	1	.0000	4750E+06

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BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) 0
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.900000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
******REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 127093.000000
FLOOR AREA (SQFT) 4647.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 475000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -360000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 46470.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 604.000000
INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00
    1.00
    1.00
    1.00

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    1.00
    1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.850000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 4250.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 201.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 78.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 1.000000
                                      WALL DATA
                                     1 2 3
WALL NUMBER
AZIMUTH ANGLE (AZ)
                                      .00
                                                90.00 180.00 -90.00
WALL AREA SQFT (AWLL)
                                 1862.0 1458.0 1548.0 1323.0
486.0 .0 253.0 94.0
WINDOW AREA SQFT (AWND)
                                    10.0 10.0 10.0
48.6 .0 25.3
.0 .0 .0 .0
WINDOW HEIGHT FT (WNDH)
                                                                        10.0
WINDOW WIDTH FT (WNDW)
WIDTH OF OVERHANG (WOH)
OVERHANG HGT ABV WNDW (HOH)
                                                                        9.4
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.060	.060	.060	.060
WALL TRANSFER FINCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
N=1 N=2 N=3 N=4 N=5 N=6	.00000	.00000	00000	00000
N=2	.00015	.00015	00015	00000
N=3	.00081	.00081	00081	00013
N=4	.00062	.00062	00062	.00061
N=5	.00008	00002	00002	.00062
N=6	*****	******	******	.00008
NUMBER OF DN FACTORS (ND)	6	6		
DN FACTORS	ŭ	0	ъ	ь
N=1	1 00000	1 00000	1 00000	
N=1 N=2 N=3 N=4	-1 71064	1.00000	1.00000	1.00000
N=3	00735	-1./1064	-1.71064	-1.71064
N=4	16642	.89735	.89735	.89735
N=5	16643	16643	16643	16643
N=6	.00728	.00728	.00728	.00728
ROOF AREA SQFT (AROF) 5313	00002	00002	00002	00002
ROOF II VALUE BEIL/IID CORE II (III)	.000000	_		
ROOF U VALUE BTU/HR-SQFT-F (URI	F) 9.30(0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0≈NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR)	2.1056	51E-03		
000 BIRANSFER FUNCTIONS (BNR)) 			
.000 .000 .439E-03 ROOF D TRANSFER FUNCTIONS (DNR)	.105E-02	.526E-03	.877E-04	
1.00 -1.98 1.34	, , , , ,			
SKYLIGHT TILT DEGREES (TILT)	374	.434E-01	170E-02	
SKYLIGHT AZIMITH ANGLE DEGREES	0.000000E	C+00		
SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0	(AZSK)	9999.000	000	
SKYLIGHT WIDTH FT (SKW) 0.00	000000000000000000000000000000000000000			
SKYLIGHT OVERHANG WIDEN FOR (ONC	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	O.00	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT SKYLIGHT GLASS NUMBER (NS)	FT (SKOH)	0.0000	00E+00	
SKYLIGHT SHADING COEFFICIENT (S	1			
SUMMED STADE MONTH AND DAY TO	SHSK) 0.	000000E+0)	
SUMMER START MONTH AND DAY FOR	SHSK (MST,	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	ISK (MND, ND	ND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	0		
DAYTIME SKY LIGHT U BTU/SQFT-HR NIGHT TIME SKYLIGHT U BTU/SQFT-	-F (SKYU)	1.2	292998	
FRACTION OF PROCESS HEAT TO INT	HR-F (SKYU	N)	1.292998	
	DDMAT OF -	- /		

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			20 1
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	10.	589.	22500.	10500.		
HOUR	HO	OURLY FRAC	CTION OF PE	AK		
1	.040	.040	.040	.040	70.0	75.0
2	.040	.040	.040	.040	70.0	75.0
3	.040	.040	.040	.040	70.0	75.0
4	.040	.040	.040	.040	70.0	75.0 75.0
5	.040	.040	.040	.040	70.0	75.0
6	.040	.040	.040	.040	70.0	75.0
7	.040	.040	.040	.040	70.0	75.0
8	.040	.040	.040	.040	70.0	75.0 75.0

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.040
                                                 70.0
                    .040
                            .040
                                                            75.0
   9
           .040
                    .040
                             .040
  10
           .040
                                       .040
                                                  70.0
                                                             75.0
                     .040
                             .040
                                       .040
                                                  70.0
                                                             75.0
  11
            .040
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.040 .040
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.040 .040
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.040 .040
.040 .040
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  12
            .040
                     .040
                                       .040
                                                  70.0
                                                              75.0
           .040
                     .040
  13
                                                  70.0
                                                             75.0
           .040
                     .040
  14
                                                  70.0
                                                             75.0
            .040
                                                  70.0
  15
                     .040
                                                             75.0
                    .040
                                                 70.0
            .040
  16
                                                              75.0
                  .040
                                                 70.0
                                                              75.0
  17
            .040
                                                 70.0
  18
        .040
                                                             75.0
                                                 70.0
70.0
70.0
70.0
          .040
                                                             75.0
  19
                    .040
  20
           .040
                                                             75.0
                    .040
  21
           .040
                                                             75.0
                    .040
                                                            75.0
  22
           .040
                                                  70.0

      23
      .040
      .040

      24
      .040
      .040

                           .040 .040 70.0
.040 .040 70.0
                                                            75.0
                                                            75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                           65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 6970.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP)
                                     1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 475000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 593750.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                       .400
.100
         .191 .200 .286 .300 .369
                                                                .451
                                               .718
                                                        .800
.500
          .537
                   .600
                            .625
                                      .700
                                                                 .812
                  1.00
.900
          .906
                           1.00
CHILLER TYPE (ITYPCH)
                            4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 92151.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000 .000 .000 .000 .000
                                                       .000
                                                                .000
                   .000
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         .000
                            .000
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                                              .000
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                                                                  .000
         .000 .000 .000
.000
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BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

SOLAR DOOR VENT THRU AND AND MNTH LOAD WINDOW ROOF SLAB BSMT WALL WINDOW INFL LATENT JAN 0. GAIN 16. 0. 0. 0. 0. 0. 0. 0. 0. 0116. LOSS -147. 081297. 0. FEB .02 GAIN 18.64 .00 .00 .00 .00 .00 .00 .00 .02 -92.85 LOSS -11.85 -6.22 .00 -5.73 -9.80 -82.45 .00 MAR 2.24 GAIN 23.60 .00 .00 .00 .10 .00 .01 .25 -77.02 LOSS -10.44 -5.75 .00 -4.25 -9.04 -74.33 .00
MNTH LOAD WINDOW ROOF SLAB BSMT WALL WINDOW INFL LATENT JAN 0. GAIN 16. 0. 0. 0. 0. 0. 0. 0. 0116. LOSS -147. 081297. 0. FEB .02 GAIN 18.64 .00 .00 .00 .00 .00 .00 .00 .02 -92.85 LOSS -11.85 -6.22 .00 -5.73 -9.80 -82.45 .00 MAR 2.24 GAIN 23.60 .00 .00 .00 .10 .00 .01 .25
FEB .02 GAIN 18.64 .00 .00 .00 .00 .00 .00 .00 .02 -92.85 LOSS -11.85 -6.22 .00 -5.73 -9.80 -82.45 .00
FEB .02 GAIN 18.64 .00 .00 .00 .00 .00 .00 .00 .02 -92.85 LOSS -11.85 -6.22 .00 -5.73 -9.80 -82.45 .00
FEB .02 GAIN 18.64 .00 .00 .00 .00 .00 .00 .00 .02 -92.85 LOSS -11.85 -6.22 .00 -5.73 -9.80 -82.45 .00 MAR 2.24 GAIN 23.60 .00 .00 .00 .10 .00 .01 .25
-92.85 LOSS -11.85 -6.22 .00 -5.73 -9.80 -82.45 .00 MAR 2.24 GAIN 23.60 .00 .00 .00 .10 .00 .01 .25
-92.85 LOSS -11.85 -6.22 .00 -5.73 -9.80 -82.45 .00 MAR 2.24 GAIN 23.60 .00 .00 .00 .10 .00 .01 .25
MAR 2.24 GAIN 23.60 .00 .00 .00 .10 .00 .01 .25
-77 00 TOCC #0.44 # -#
-77 00 TOCC #0.44 # -#
-77.02 LOSS -10.44 -5.75 .00 -4.25 -9.04 -74.33 .00
APR 10.57 GAIN 22.32 .06 .04 .00 .74 .07 .47 1.73
-35.74 LOSS -5.74 -3.25 .00 -1.74 -5.12 -39.62 .00
.00 1.74 5.12 -39.62 .00
MAY 25.97 GAIN 23.30 .41 .15 .00 1.94 .23 1.34 7.02
-11.21 LOSS -2.43 -1.68 .0027 -2.56 -17.77 .00
JUN 59.43 GAIN 23.30 1.11 .41 .00 3.37 .63 3.87 28.51
-1.62 LOSS6366 .00 .0099 -5.98 .00
JUL 83.30 GAIN 23.30 2.31 .96 .00 4.47 1.51 9.68 40.50
64 LOSS3341 .00 .0062 -3.78 .00
AUG 74.18 GAIN 21.46 1.63 .74 .00 3.80 1.14 6.95 38.18
-1.04 LOSS3547 .00 .0071 -4.34 .00
SEP 43.73 GAIN 20.16 .59 .37 .00 2.07 .60 3.98 20.86
-11.41 LOSS -2.24 -1.35 .0036 -2.09 -15.12 .00
-100 100 130 2.05 -15.12 .00
OCT 10.70 GAIN 18.45 .02 .06 .00 .44 .09 .57 2.91
-33.03 LOSS -6.15 -3.06 .00 -1.94 -4.71 -34.11 .00
NOV 2.92 GAIN 16.39 .00 .00 .00 .05 .00 .01 .51
-60.89 LOSS -9.33 -4.64 .00 -4.15 -7.15 -54.59 .00
DEG. A CASE
DEC 0. GAIN 15. 0. 0. 0. 0. 0. 0. 0.
-112. LOSS -147. 081192. 0.
TOT 313. GAIN 243. 6. 3. 0. 17. 4 27 140
-554. LOSS -7842. 03466521. 0.
MAX HEATING LOAD= -387684. BTUH ON DEC 18 HOUR 2 AMBIENT TEMP 3.
MAX COOLING LOAD 313C40 DUILL ON CED 2 100
12M COOLING HOAD

ZONE UA BTU/HR-F 1460.0

BEACON Energy Analysis By EMC Engineers, Inc. 637AFG.I

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

TAITEDAL	7) T								FAN T	OTAL
INTERN		RNAL	SDVCE			COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
		PERAT				CIDENT	THOUSAND		MILLION	
MONTH							KWH	BTU	BTU	BTU
				2111			20,722	210	210	210
JAN	70.	77.		1	13	53.	.23	.09	3.78	5.09
			69.	27	6	4.				
FEB	70.	78.		26	12	58.	.20	.08	3.41	4.57
			69.	20	6	15.				
MAR	71.	81.			12	64.	.22	.09	3.78	5.05
			68.	24	19	69.				
• • • •										
APR	72.	78.	69.	25 1	12 1	77. 33.	.21	.09	3.66	4.87
			69.	1	1	33.				
MAY	73	78.		31	12	80.	.23	.09	3.78	5.09
1411	,,,	,	69.	11	5	39.	.25	.05	3.70	5.05
			05.			55.				
JUN	74.	78.		29	12	87.	.21	.09	3.66	4.87
			70.	17	5	56.				
JUL	75.	78.		27	12	90.	.22	.09	3.78	5.05
			70.	10	5	57.				
				/						
AUG	75.	78.		30	12	86.	.23	.09	3.78	5.09
			70.	25	6	51.				
SEP	74	78.		9	12	86.	.20	.08	3.66	4.83
761	, .	70.	69.	15	6	39.	.20	.00	3.00	4.05
			05.	13	Ů	JJ.				
OCT	72.	78.		4	12	83.	.23	.09	3.78	5.09
			69.	28	5	31.				
NOV	71.	78.		8	13	77.	.22	.09	3.66	4.92
			69.	3	7	18.				
DEC	70.	77.			13	57.	.21	.09	3.78	5.01
			68.	18	7	-1.				
YEAR							2.59	1 06	44.48	59.55
1 EMR							2.39	1.00	44.40	<i>39</i> .33

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER O	F HOURS WHEN	MUMIXAM I	LOADS
		INCLUDING	LOADS W	ERE NOT MET	BTU	J
MONTE	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	717	8	0	0	3771E+06	.0000
FEB	632	24	0	0	3103E+06	.2269E+05
MAR	639	76	0	0	3174E+06	.1325E+06
APR	484	173	0	0	1863E+06	.1550E+06
MAY	329	311	0	0	1226E+06	.1985E+06
JUN	119	431	0	0	4308E+05	.2736E+06
${ m JUL}$	61	577	0	0	3215E+05	.2849E+06
AUG	63	538	0	0	5484E+05	.2697E+06
SEP	236	347	0	0	1174E+06	.3126E+06
OCT	510	158	0	0	1747E+06	.2259E+06
NOV	616	67	0	0	2466E+06	.1592E+06
DEC	710	12	0	0	3877E+06	.7088E+05
YEAR	5116	2722	0	0	3877E+06	.3126E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	171.74	.00	.23	.09	1.11	5.09	1.9
FEB	142.29	.00	.20	.08	1.00	4.57	5.1
MAR	126.21	.21	.22	.09	1.11	5.05	12.8
APR	73.68	.98	.21	.09	1.07	4.87	14.1
MAY	39.87	2.30	.23	.09	1.11	5.09	17.6
JUN	13.46	4.95	.21	.09	1.07	4.87	23.8
JUL	6.90	6.92	.22	.09	1.11	5.05	24.7
AUG	7.14	6.16	.23	.09	1.11	5.09	23.2
SEP	30.43	3.67	.20	.08	1.07	4.83	26.4
OCT	73.44	.96	.23	.09	1.11	5.09	19.8
NOV	108.62	.28	.22	.09	1.07	4.92	14.6
DEC	168.31	.02	.21	.09	1.11	5.01	8.5
YEAR	962.08	26.47	2.59	1.06	13.03	59.55	26.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 238173. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 637AFG.I

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					HOUR	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	ΓΕM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/	P	MBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.0000	3771E+06
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.2269E+05	3103E+06
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.1325E+06	3174E+06
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.1550E+06	1863E+06
MASZ	0.570	1000				_				
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.1985E+06	1226E+06
JUN	2646.	1993.	1.000	72.	0.	^	•	•	00000	
OON	2040.	1993.	1.000	12.	0.	0.	0	0	.2736E+06	4308E+05
JUL	2549.	2018.	1.000	77.	0.	Ο.	0	0	20405.06	3215E+05
			1.000	, , .	٥.	٥.	Ü	U	.20435+06	32156+05
AUG	2291.	1849.	1.000	76.	0.	Ο.	0	0	2697E+06	5484E+05
						•		ŭ	.205,2100	.51018+05
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.3126E+06	1174E+06
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.2259E+06	1747E+06
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.1592E+06	2466E+06
DEC	916.	627.	1.000	35.	0.	0.	0	0	.7088E+05	3877E+06

```
BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION
   ----- PROGRAM CONTROL OPTIONS -----
  COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
  ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
  WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.900000E-01
  LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
  SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
  WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
  WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
  ----- SITE AND BUILDING DATA -----
  *****REAL WEATHER FROM DISK******
   FILE NAME MO
  STATION 13995 YEAR 1955
  SITE LATITUDE DEG (AL1)
                                      37.000000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                        1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                             70,000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 127093.000000
 FLOOR AREA (SQFT) 4647.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 475000.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -360000.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 46470.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 604.000000
 INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00

                       1.00
                                                               1.00 1.00 1.00
1.00 1.00 1.00
  1.00 1.00
  1.00
               1.00
  1.00
              1.00
                                                                                         1.00
 A FACTOR IN INFILTRATION EQUATION (CINA) 2.850000E-01
 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
 BUILDING THERMAL MASS MCP BTU/F (CMCP) 4250.000000
 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 201.000000
 PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 78.000000
WINDOW GLASS NUMBER (NG) 30
 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
 WINDOW SHADING FACTOR (SHD) 1.000000
                                          WALL DATA

        WALL NUMBER
        1
        2
        3
        4

        AZIMUTH ANGLE (AZ)
        .00
        90.00
        180.00
        -90.00

        WALL AREA SQFT (AWLL)
        1862.0
        1458.0
        1548.0
        1323.0

        WINDOW AREA SQFT (AWND)
        486.0
        .0
        253.0
        94.0

        WINDOW HEIGHT FT (WNDH)
        10.0
        10.0
        10.0
        10.0

        WINDOW WIDTH FT (WNDW)
        48.6
        .0
        25.3
        9.4

        WIDTH OF OVERHANG (WOH)
        .0
        .0
        .0
        .0

        OVERHANG HGT ABV WNDW (HOH)
        .0
        .0
        .0
        .0
```

.0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.052	.052	.052	.052
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00018	.00018	.00000 .00018	.00018
N=3	.00084	.00084	.00084	.00084
N=4	.00056	.00056	.00056	.00056
N=5	.00006	.00006	.00006	.00006
N=1 N=2 N=3 N=4 N=5	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4	1.00000	1.00000	1.00000	1 00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	83196
N=4	14508	14508	- 14508	- 14508
N=5	.00613	.00613	.00613	00613
N=6	00002	00002	.00613 00002	- 00002
ROOF AREA SQFT (AROF) 5313	.000000		.00002	.00002
ROOF U VALUE BTU/HR-SQFT-F (URI		0000E-02		
ROOF TRANS FUNCTIONS USED (1=YF			1	
ROOF C TRANSFER FUNCTION (CNR)	2.1056	61E-03	-	
ROOF B TRANSFER FUNCTIONS (BNR)		00		
.000 .000 .439E-03		.526E-03	877E-04	
ROOF D TRANSFER FUNCTIONS (DNR)			.07,2 01	
1.00 -1.98 1.34 -		.434E-01	170E-02	
SKYLIGHT TILT DEGREES (TILT)			V2.02 02	
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0				
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SH	ISK (MND, N	OND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.00000E+	0.0		
DAYTIME SKY LIGHT U BTU/SQFT-HR	-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKYT	JN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPA	CE (FAP)	1.5000001	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	10.	589.	22500.	10500.		
HOUR	HO	URLY FRACT	TION OF PE	AK		
1	.040	.040	.040	.040	70.0	75.0
2	.040	.040	.040	.040	70.0	75.0
3	.040	.040	.040	.040	70.0	75.0
4	.040	.040	.040	.040	70.0	75.0
5	.040	.040	.040	.040	70.0	75.0
6	.040	.040	.040	.040	70.0	75.0
7	.040	.040	.040	.040	70.0	75.0
8	.040	.040	.040	.040	70.0	75.0

```
.040 .040 .040
                                                70.0
                                                          75.0
  9
          .040
                                                70.0
 10
           .040
                   .040
                            .040
                                     .040
                                                          75.0
           .040
                    .040
                            .040
                                     .040
                                                70.0
                                                          75.0
 11
 12
           .040
                    .040
                            .040
                                     .040
                                                70.0
                                                          75.0
           .040
                            .040
 13
                    .040
                                     .040
                                                70.0
                                                          75.0
         .040
                            .040
                    .040
                                                70.0
 14
                                     .040
                             .040
           .040
                                               70.0
                                                          75.0
 15
                    .040
                                     .040
                   .040
                                               70.0
                                                          75.0
 16
           .040
                             .040
                                     .040
                                               70.0
                            .040
                                     .040
                   .040
                                                          75.0
 17
           .040
                   .040
                           .040
                                               70.0
                                                         75.0
                                     .040
 18
           .040
                          .040
                   .040
                                  .040
                                               70.0
                                                         75.0
 19
           .040
                                               70.0
                                   .040
                   .040
                                                          75.0
           .040
 20
                            .040
                                               70.0
                   .040
                                     .040
                                                          75.0
 21
           .040
                            .040
                                     .040
 22
           .040
                    .040
                                                70.0
                                                          75.0
                   .040
                          .040 .040
.040 .040
           .040
                                                          75.0
 23
                                                70.0
                                             70.0
                   .040
                                                          75.0
           .040
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
                                         65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 6970.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR
                             0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP)
                                    1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 475000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 593750.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
        .191 .200 .286 .300 .369
                                                    .400
                                                             .451
                                    .700
                                                     .800
         .537
                  .600
                           .625
                                            .718
                                                              .812
.500
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 4
                          1.00
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 92151.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                    .000 .000
     .000 .000 .000 .000
                                                     .000
         .000
                                                               .000
.000
                 .000
                          .000
                                    .000
                                            .000
.000
        .000
                 .000
                         .000
```

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	TN				
			SOLAR		D00	R			VENT	
			THRU		AND				AND	
I'MM	'H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDO	W INFL	LATENT
JAN	Ι.Ο	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-115.	LOSS		-14.	-7.	0.	-7.			0.
FEB	.02	GAIN	18.64	.00	.00	.00	.00	.00	.00	.02
	-92.13	LOSS		-11.85	-6.22		-4.96			
	2.25	GAIN	23.60	.00	.00	.00	.10	.00	.01	.25
	-76.55	LOSS		-10.45	-5.75	.00	-3.70	-9.04	-74.38	.00
	10.54	GAIN	22.32	.06	.04	.00	.68	.07	.47	1.69
	-35.62	LOSS		-5.74	-3.25	.00	-1.52	-5.12	-39.64	.00
MAY	25.87	GAIN	23.30	.41	.15	.00	1.71	.23	1.34	7.00
	-11.31	LOSS		-2.42	-1.68	.00	26	-2.56	-17.75	.00
JUN	58.96	GAIN	23.30	1.11	.41	.00	2.93	. 63	3.87	28.29
	-1.69	LOSS		62	65	.00	.00	98	-5.90	.00
JUL	82.34	GAIN	23.30	2.31	.96	.00	3.88	1.51	9.68	40.04
	69	LOSS		32	40	.00	.00	61	-3.74	.00
AUG			21.46						6.95	37.52
	-1.08	LOSS		34	46	.00	.00	70	-4.29	.00
SEP	43.23	GAIN	20.16	.59	.37	.00	1.81	.60	3.98	20.51
	-11.44	LOSS		-2.24	-1.34		33			
OCT	10.72		18.45				.40			
	-32.88	LOSS		-6.15	-3.06	.00	-1.70	-4.70	-34.14	.00
	2.95		16.39		.00		.05			.51
	-60.42	LOSS		-9.33	-4.65	.00	-3.61	-7.15	-54.63	.00
DEC	0.		15.	Ο.	0.	0.	0.	0.	0.	0.
	-111.	LOSS		-14.	-7.	0.	-7.	-11.	-92.	0.
TOT	310.			6.			15.			
	-550.	LOSS		-78.	-42.	0.	-29.	-65.	-521.	0.
MAX	HEATING	LOAD=	-385	5807. B	TUH ON	DEC 18	HOUR 2	ΔM¤	TENT ייד∾	ID 2
MAX	HEATING COOLING	LOAD=	312	2032. B	TUH ON	SEP 2	HOUR 12	AMB	IENT TEM	iP 91.

ZONE UA BTU/HR-F 1410.5

BEACON Energy Analysis By EMC Engineers, Inc. 637ARGD.I

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

INTERN	2 ∆.T.								FAN TO	OTAL
INILIA		RNAL	SPACE			COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND	MILLION	MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR .	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	77.		31	13	59.	.23	.09	3.78	5.09
			69.	27	6	4.				
FEB	70.	78.		26	12	58.	.20	.08	3.41	4.57
			69.	20	6	15.				
MAR	71.	81.		27	12	64.	.22	.09	3.78	5.05
			68.	24	19	69.				
APR	72.	78.		25	12	77.	.21	.09	3.66	4.87
			69.	11	5	32.				
MAY	73.	78.		31	12	80.	.23	.09	3.78	5.09
			69.	11	5	39.				
JUN	74.	78.		29	12	87.	.21	.09	3.66	4.87
			70.	17	5	56.				
JUL	75.	78.		27	12	90.	.22	.09	3.78	5.05
			70.	10	5	57.				
AUG	75.	78.		30	12	86.	.23	.09	3.78	5.09
			70.	25	6	51.				
SEP	74.	78.		1	12	87.	.20	.08	3.66	4.83
			69.	15	6	39.				
OCT	72.	78.		4	12	83.	.23	.09	3.78	5.09
			69.	28	5	31.				
NOV	71.	78.		8	13	77.	.22	.09	3.66	4.92
			69.	3	7	18.				
DEC	70.	77.		16	13	57.	.21	.09	3.78	5.01
			68.	18	7	-1.				
YEAR							2.59	1.06	44.48	59.55

BEACON Energy Analysis By EMC Engineers, Inc. 637ARGD.I

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	F HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WI	ERE NOT MET	BTU	ד
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	717	9	0	0	3757E+06	.0000
FEB	632	26	0	0	3088E+06	.2386E+05
MAR	638	77	0			
APR	484	171			3160E+06	.1326E+06
		· -	0	0	1859E+06	.1548E+06
MAY	329	309	0	0	1225E+06	.1982E+06
JUN	121	427	0	0	4357E+05	.2731E+06
JUL	62	570	0	0	3275E+05	.2841E+06
AUG	66	529	0		5529E+05	
SEP	240	342	0	-		.2691E+06
OCT	512		-	_	1171E+06	.3120E+06
		159	0	0	1740E+06	.2257E+06
NOV	615	67	0	0	2452E+06	.1593E+06
DEC	710	12	0	0	3858E+06	.7189E+05
YEAR	5126	2698	0	0	3858E+06	.3120E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	TION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
MONTH	ВТО	IMII			14411		
JAN	170.74	.00	.23	.09	1.11	5.09	1.9
FEB	141.58	.00	.20	.08	1.00	4.57	5.2
MAR	125.64	.22	.22	.09	1.11	5.05	12.8
APR	73.66	.98	.21	.09	1.07	4.87	14.1
MAY	39.88	2.29	.23	.09	1.11	5.09	17.6
JUN	13.69	4.91	.21	.09	1.07	4.87	23.8
JUL	7.01	6.84	.22	.09	1.11	5.05	24.7
AUG	7.48	6.07	.23	.09	1.11	5.09	23.2
SEP	30.89	3.63	.20	.08	1.07	4.83	26.4
OCT	73.52	.96	.23	.09	1.11	5.09	19.8
NOV	108.09	.28	.22	.09	1.07	4.92	14.6
DEC	167.32	.02	.21	.09	1.11	5.01	8.6
YEAR	959.50	26.20	2.59	1.06	13.03	59.55	26.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 237425. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL SANCT. AREA - ZONE 1 ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	P	AVG. MBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT	SYSTEM NOT	WHEN LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.0000	3757E+06
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.2386E+05	3088E+06
MAR	1944.	1269.	1.000	43.	0.	Ο.	0	0	.1326E+06	3160E+06
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.1548E+06	1859E+06
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.1982E+06	1225E+06
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.2731E+06	4357E+05
JUL	2549.	2018.	1.000	77.	0.	Ο.	0	0	.2841E+06	3275E+05
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.2691E+06	5529E+05
SEP	1878.	1388.	1.000	68.	0.	Ο.	0	0	.3120E+06	1171E+06
OCT	1467.	972.	1.000	57.	0.	Ο.	0	0	.2257E+06	1740E+06
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.1593E+06	2452E+06
DEC	916.	627.	1.000	35.	0.	0	0	0	.7189E+05	3858E+06

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BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 7.500000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN)
                               1.000000
NUMBER OF ZONES (NZ)
                            1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME MO
STATION 13995
             YEAR 1955
SITE LATITUDE DEG (AL1)
                           37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                        1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                          56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN)
                                            20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                           70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 29753.000000
FLOOR AREA (SQFT) 3189.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 120000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -180000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 31890.000000
CONSTANT INFILTRATION RATE CFM (CFMI)
                                     215.000000
INFILTRATION PROFILE
                           1.00
                                    1.00
                                              1.00
                                                       1.00
                                                                  1.00
1.00
      1.00 1.00
                           1.00 1.00
1.00 1.00
                                              1.00
 1.00
         1.00
                  1.00
                                                       1.00
                                                                 1.00
         1.00 1.00
                                              1.00
                                                       1.00
                                                                 1.00
1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 4.340000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 13970.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 182.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 29.000000
WINDOW GLASS NUMBER (NG)
                         30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
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	WALL DAT	A		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	ຸ90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	929.0	358.0	822.0
WINDOW AREA SQFT (AWND)	.0	42.3	.0	106.0
WINDOW HEIGHT FT (WNDH)	.0	10.0	.0	10.0
WINDOW WIDTH FT (WNDW)	.0	4.2	.0	10.6
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	. 0	.0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5 N=6	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	******	******	*****	*****
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=1 N=2 N=3 N=4 N=5	*****	*****	*****	*****
ROOF AREA SQFT (AROF) 3189	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 4.11	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)	6.0474	39E-03		
ROOF B TRANSFER FUNCTIONS (BNR				
.185E-05 .509E-03 .294E-02		.305E-03	.648E-05	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.33 .558			999.	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00			
SKYLIGHT WIDTH FT (SKW) 0.0 SKYLIGHT OVERHANG WIDTH FT (SK	00000E+00			
OVERHANG HEIGHT ABOVE SKYLIGHT			0.07.00	
SKYLIGHT GLASS NUMBER (NS)		0.0000	00E+00	
SKYLIGHT SHADING COEFFICIENT (00000000	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SI	HSK (MND N	, אום אום מאום	1	1
SKY LIGHT AREA SQFT (ASKY)			-	-
DAYTIME SKY LIGHT U BTU/SOFT-H	R-F (SKYU)	j ·	292998	
DAYTIME SKY LIGHT U BTU/SQFT-HI NIGHT TIME SKYLIGHT U BTU/SQFT-	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	6.3000001	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	4.	38839.	1225.	775.		
HOUR	HO	OURLY FRACT	CION OF PEA	AK		
1	.100	.100	.000	.000	70.0	75.0
2	.100	.100	.000	.000	70.0	75.0
3	.100	.100	.000	.000	70.0	75.0
4	.100	.100	.000	.000	70.0	75.0
5	.100	.100	.000	.000	70.0	75.0
6	.100	.100	.000	.000	70.0	75.0
7	.100	.100	.000	.000	70.0	75.0
8	1.000	.400	1.000	1.000	70.0	75.0

9	1.000	.300	1.000	1.000	70.0	75	5.0
10	1.000	.300	1.000	1.000	70.0	75	5.0
11	.800	.300	1.000	1.000	70.0	75	5.0
12	.800	.300	1.000	1.000	70.0	75	5.0
13	1.000	.300	1.000	1.000	70.0	75	5.0
14	1.000	.300	1.000	1.000	70.0	75	5.0
15	1.000	.300	1.000	1.000	70.0	75	5.0
16	1.000	.300	1.000	1.000	70.0	75	5.0
17	1.000	.100	1.000	1.000	70.0	75	5.0
18	.100	.100	.000	.000	70.0	75	5.0
19	.100	.100	.000	.000	70.0	75	5.0
20	.100	.100	.000	.000	70.0	75	5.0
21	.100	.100	.000	.000	70.0	75	5.0
22	.100	.100	.000	.000	70.0	75	5.0
23	.100	.100	.000	.000	70.0	75	5.0
24	.100	.100	.000	.000	70.0	75	5.0
NO HEAT	ING ABOVE AMB	IENT TEMP.	OF (THLK	OT) 68	.000000		
NO COOL	ING BELOW AMB			OT) 60	.000000		
SYSTEM '	TYPE, (IECN)	2	2				
SUPPLY .	AIR CFM (SACF)	4785	5.000000				
ECONOMI	ZER HIGH TEMP	LIMIT F	0.00000	DE+00			
SYSTEM	SUPPLY AIR STA	ART TIME H	IR 0.000	000E+00			
SYSTEM	SUPPLY AIR STO	OP TIME HE	24.	.000000			
	MIXED AIR TEM						
	SIDE AIR FRACT			0.00000	00E+00		
	ICIENCY (EFAN)						
	AL PRESSURE IN						
	PLANT RATED (
	PLANT RATED						
	PLANT PART LO			•	•		
.420	.100	.560	.200	.650	.300	.710	.400
.740	.500	.750	.600	.760	.700	.780	.800
.790	.900	.800	1.00				
	TYPE (ITYPCH)		3				
	PLANT RATED (
	PLANT RATED DEPLANT PART LO						
.000	.000	.000	.000		•	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	ΓN				
			SOLAR		D001	R			VENT	,
			THRU		AND				AND	
	TH LOAD		WINDOW	ROOF	SLAB	BSMT	' WALL	WINDO	W INFL	LATENT
JAI	1 .22		2.09		.00		.00		.00	
	-31.33	LOSS		-3.80	-5.57	.00	-11.07			.00
	.13				.00	.00	.02	.00	.00	.04
	-23.79	LOSS		-3.14	-4.73		-8.21			.00
MAR	1.32				.00		.46	.00	.00	.14
	-18.23	LOSS		-2.82	-4.40	.00	-6.49	-1.63	-16.87	.00
7 00		~	_							
APR	6.01		3.54		.03		1.67		.11	.59
	-6.69	LOSS		-1.68	-2.61	.00	-3.09	97	-9.31	.00
MAN	12 60	03 TV								
I-TH-I	13.60 -1.05		3.88						.30	
	-1.05	LOSS		-1.03	-1.54	.00	-1.25	55	-4.63	.00
JUN	26.30	GAIN	3 00							
0011	.00	LOSS	3.89	55	.31	.00	4.91	.11	.88	8.32
	.00	HOSS		55	67	.00	31	24	-1.88	.00
JUL	34.50	GAIN	4.01	.85	.72	0.0	c .c			
	.00	LOSS	4.01		40	.00	6.46 14		2.20	
					.40	.00	14	14	-1.13	.00
AUG	31.61	GAIN	3.52	.68	.56	. 00	5.38	20	1 50	10.62
	02	LOSS		41		.00			-1.23	
									1.25	.00
SEP		GAIN	3.01	.31	.28	.00	2.93	.11	.91	6.38
	-1.57	LOSS		88	-1.18	.00	-1.15		-3.75	.00
OCT	5.12		2.50	.06	.04	.00	.74	.02	.13	1.02
	-5.97	LOSS		-1.79	-2.49	.00	-3.57	90	-8.07	.00
MOIT										
	1.44		1.95		.00		.13	.00	.00	.25
	-14.64	LOSS		-2.54	-3.60	.00	-6.54	-1.31	-12.62	.00
חשכי	.01	(12 T);								
	-30.52				.00		.00	.00	.00	.00
	-30.52	LOSS		-3.78	-5.46	.00	-11.22	-2.00	-21.13	.00
тот	139.	CATN	26	3	2.	_				
	-134.		50.	າ.	-33.	0.	26. -53.	1.	6.	40.
	231.	1000		-23.	-33.	υ.	-53.	-12.	-122.	0.
MAX	HEATING	LOAD=	-120	000 ₽	י אי עווי	NEC 10	uoim =	***	IENT TEM	_
MAX	COOLING	LOAD=	101	332 127		ЛП. ЭЭ :	HOUR 7	AMB:	IENT TEM IENT TEM	P -1.
			- V.	a. Di	. OII OIN L	ОШ Z / .	HOUR 15	AMB.	LENT TEM	P 92.

ZONE UA BTU/HR-F 768.7

BEACON Energy Analysis By EMC Engineers, Inc.

637B.I

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

INTERN	n T								FAN T	OTAL
INTERNA		ΡΝΔΤ.	SPACE			COIN-	LIGHTING	DDOCECC	HEAT	HEAD CATH
			URE F			CIDENT		MILLION	MILLION	HEAT GAIN MILLION
MONTH								BTU	BTU	BTU
JAN	70.	76.		5 27		64. 4.	1.22	7.69	2.07	11.45
FEB	70.	76.	69.	9		59. 14.	1.10	6.89	1.87	10.28
MAR	71.	79.	69.	25 4	17 6	56. 15.	1.21	7.62	2.07	11.37
APR	73.	80.	69.	3 9	17 6	58. 30.	1.17	7.36	2.01	10.98
MAY	75.	82.	70.		17 6	53. 39.	1.22	7.69	2.07	11.45
JUN	75.	76.	70.		16 6		1.17	7.36	2.01	10.98
JUL	76.	76.	72.		16 6	94. 60.	1.21	7.62	2.07	11.37
AUG	7 5.	76.	70.	29 25	16 7	95. 55.	1.22	7.69	2.07	11.45
SEP	74.	76.	70.	3 15	13 6	89. 39.	1.16	7.29	2.01	10.90
OCT	73.	80.	69.	24 28	15 7	59. 34.	1.22	7.69	2.07	11.45
NOV	71.	77.	69.	9 3	15 7	51. 18.	1.18	7.42	2.01	11.06
DEC	70.	75.	69.	23 18		67. -1.	1.20	7.56	2.07	11.29
YEAR							14.32	89.87	24.43	134.07

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING C	COOLING	HEATING	COOLING
JAN	682	12	0	0	1147E+06	.2524E+05
FEB	565	8	0	0	9499E+05	.2410E+05
MAR	515	58	0	0	9710E+05	.4444E+05
APR	264	209	0	0	5708E+05	.5883E+05
MAY	63	402	0	0	3825E+05	.7272E+05
JUN	1	585	0	0	-41.20	.9257E+05
JUL	0	680	0	0	.0000	.1013E+06
AUG	3	672	0	0	-8627.	.9076E+05
SEP	84	455	0		3638E+05	.9288E+05
OCT	267	181	0		5279E+05	.6542E+05
NOV	470	68	0		7999E+05	.4583E+05
DEC	701	3	1		1200E+06	7995.
YEAR	3615	3333	7		1200E+06	
	-0.5	2223	±	U	IZUUE+U6	.1013E+06

BEACON Energy Analysis By EMC Engineers, Inc. 637B.I

SYSTEM TOTALS

моитн	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	THE FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	16.89	.03	1.22	7.69	.61	11.45	7.6
FEB	12.37	.02	1.10	6.89	.55	10.28	7.5
MAR	9.85	.15	1.21	7.62	.61	11.37	9.4
APR	4.00	.67	1.17	7.36	.59	10.98	10.7
MAY	.95	1.48	1.22	7.69	.61	11.45	11.7
JUN	.02	2.74	1.17	7.36	.59	10.98	13.1
JUL	.00	3.52	1.21	7.62	.61	11.37	13.7
AUG	.05	3.28	1.22	7.69	.61	11.45	13.0
SEP	1.26	2.01	1.16	7.29	.59	10.90	12.7
OCT	4.01	.57	1.22	7.69	.61	11.45	11.2
NOV	7.72	.17	1.18	7.42	.59	11.06	9.6
DEC	17.05	.00	1.20	7.56	.61	11.29	4.7
YEAR	74.15	14.64	14.32	89.87	7.16	134.07	13.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 90086. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 637B.I

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 BASELINE

OTHER MONTHLY STATISTICS

	CLEAR	3 (1001)								
	DAY SOLAR	ACTUAL SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					HOUR	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/		AMBT.	TEMP. D		NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.2524E+05	1147E+06
FEB	1494.	948.	1.000	37.	0.	Ο.	0	0	.2410E+05	9499E+05
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.4444E+05	9710E+05
APR	2323.	1608.	1.000	55.	0.	0.	0	0	.5883E+05	5708E+05
MAY	2570.	1829.	1.000	65.	0.	0.	0	0	.7272E+05	3825E+05
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.9257E+05	-41.20
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.1013E+06	.0000
AUG	2291.	1849.	1.000	76.	0.	Ο.	0	0	.9076E+05	-8627.
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.9288E+05	3638E+05
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.6542E+05	5279E+05
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.4583E+05	7999E+05
DEC	916.	627.	1.000	35.	0.	0.	0	1	7995.	1200E+06

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BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION
  ----- PROGRAM CONTROL OPTIONS -----
  COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
  ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
  WEEKEND INTERNAL GAINS FACTOR (WKEND) 7.500000E-01
  LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
  WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
  WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
  ----- SITE AND BUILDING DATA -----
  *****REAL WEATHER FROM DISK******
  FILE NAME MO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                                   37.000000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                     1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                       56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 29753.000000
 FLOOR AREA (SQFT) 3189.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 120000.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -180000.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 31890.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 215.000000
 INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

                                                                       1.00 1.00
1.00 1.00
1.00 1.00
 A FACTOR IN INFILTRATION EQUATION (CINA) 4.340000E-01
 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
 BUILDING THERMAL MASS MCP BTU/F (CMCP) 13970.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 182.000000
 PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 29.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                       WALL DATA
                                       1 2
WALL NUMBER
                                                              3
AZIMUTH ANGLE (AZ)

WALL AREA SQFT (AWLL)

WINDOW AREA SQFT (AWND)

WINDOW HEIGHT FT (WNDH)

WINDOW WIDTH FT (WNDW)

WINDOW WIDTH FT (WNDW)

WINDOW GOVERHANG (WOH)

OVERHANG HGT ABV WNDW (HOH)

OUT 10.0

10.0

10.0

10.0

10.0

10.0

10.0

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10.0

10.0

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10.0

10.0
                                                   90.00 180.00 -90.00
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MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120 0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	064
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.00176	.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000 .00016	. 00000
N=1 N=2 N=3 N=4 N=5 N=6	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	*****	*****	*****	*****
NUMBER OF DIN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=1 N=2 N=3 N=4	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	- 16643
N=5	.00728	.00728	.00728	00728
N=6	00002		00002	
ROOF AREA SQFT (AROF) 3189.	.000000			.00002
ROOF U VALUE BTU/HR-SQFT-F (URI	7) 4.11	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YE	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	6.0474	39E-03	-	
ROOF B TRANSFER FUNCTIONS (BNR)				
.185E-05 .509E-03 .294E-02	.228E-02	.305E-03	.648E-05	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.33 .558 -	.787E-01	.230E-02	999.	
SKYLIGHT TILT DEGREES (TILT)	0.0000001	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	W) 0.00	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S	HSK) 0.	000000E+00	כ	
SUMMER START MONTH AND DAY FOR	SHSK (MST,	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	SK (MND, NI	ND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	0		
DAYTIME SKY LIGHT U BTU/SQFT-HR NIGHT TIME SKYLIGHT U BTU/SQFT-	-F (SKYU)	1.2	292998	
EPACTION OF DEOCRES HEAD TO THE	HR-F (SKYU	ΠN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	EKNAL SPAC	E (FAP)	6.300000E	-01

------INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

KW		BTU/HR -			
		PEOPLE	PEOPLE		
LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
4.	38839.	1225.	775.		
H	OURLY FRACT	ION OF PE	AK		
.100	.100	.000	.000	70.0	75.0
.100	.100	.000	.000	70.0	75.0
.100	.100	.000	.000	70.0	75.0
.100	.100	.000	.000	70.0	75.0
.100	.100	.000	.000	70.0	75.0
.100	.100	.000	.000	70.0	75.0
.100	.100	.000	.000	70.0	75.0
1.000	.400	1.000	1.000	70 0	75.0
	LIGHTS 4 H0 .100 .100 .100 .100 .100 .100 .100 .1	LIGHTS PROCESS S 4. 38839. HOURLY FRACT .100 .100 .100 .100 .100 .100 .100 .100 .100 .100 .100 .100 .100 .100 .100 .100	PEOPLE LIGHTS PROCESS SENSIBLE 4. 38839. 1225. HOURLY FRACTION OF PE .100 .100 .000 .100 .100 .000 .100 .100	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT 4. 38839. 1225. 775. HOURLY FRACTION OF PEAK100 .100 .000 .000 .100 .100 .000 .000	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT HEATING 4. 38839. 1225. 775. HOURLY FRACTION OF PEAK100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0 .100 .100 .000 .000 70.0

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                  1.000 1.000 1.000

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                                       1.000
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                                                              75.0
           .800
  11
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                                                              75.0
            .800
  12
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                                                              75.0
  13
          1.000
                                                              75.0
                                                   70.0
  14
          1.000
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          1.000
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  16
          1.000
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  17
          1.000
                                                   70.0
                                                               75.0
  18
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  21
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  22
             .100
                      .100
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                                                     70.0
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  23
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             .100
                      .100
                               .000
                               .000
                                                     70.0
                                                              75.0
                                         .000
  24
             .100
                      .100
                                                70.0
                                                              75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 4785.000000
ECONOMIZER HIGH TEMP LIMIT F 0.000000E+00
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                                 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
                                 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 0.000000E+00
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 120000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 150000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                .560 .200 .650 .300
 .420
       .100
                                                        .710 .400
.750 .600
.790 .900 .800 1.00
CHILLER TYPE (ITYPCH) 3
COOLING PLANT PAGE
                            .600
                                       .760
                                               .700
                                                          .780
                                                                   .800
COOLING PLANT RATED OUTPUT BTU (CFLOT) 180000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 46075.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
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BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTIT DOOF AND	3			VENT AND	
	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDO	W INFL	LATENT
	.33		2.09	.00	.00	.00			.00	
	-23.37			-3.82		.00			-22.31	.00
	.26		2.68		.00		.00	.00	.00	.04
	-18.13			-3.16	-4.77	.00	-2.17	-1.77	-19.01	.00
	1.29		3.32	.02	.00	.00	.03	.00	.00	.10
	-13.97	LOSS		-2.84	-4.43	.00	-1.61	-1.64	-16.99	.00
APR	5.35	GAIN	3.54	.13	.03	.00	.24	.01	.11	.57
	-5.16	LOSS		-1.69	-2.63	.00	66	98	-9.38	.00
MAY			3.88	.33	.11	.00	.65	.04	.30	2.08
	75			-1.03	-1.54	.00	14	55	-4.62	.00
JUN	22.64		3.89				1.19		.88	8.04
		LOSS		54			.00		-1.88	.00
JUL	29.69		4.01	.85			1.65			10.65
3110		LOSS		38		.00			-1.12	.00
AUG			3.52	.68			1.37		1.58	10.49
משט	01		2 01	41					-1.22	
SEP	17.36 -1.23		3.01	.31					.91	
OCT	5.18		2.50	88					-3.74	
OCI	-4.27			-1.83	.04 -2.54		.09			1.03
NOV	1.83		1.95				86		-8.27	.00
	-10.46		1.95	-2.56			.00		.00	.29
	.08		1 70	.00			-1.69			.00
	-22.43			-3.79			.00			.00
	123.								-21.21	
101	-100.		30.		2.				6.	
					-33.				-123.	0.
XAM	HEATING	LOAD=	-96	070. E	BTUH ON 1	DEC 18	HOUR 7	AME	SIENT TEN	MP -1.
MAX	COOLING	LOAD=	88	1897. E	TUH ON .	JUL 27	HOUR 15	AME	SIENT TEN	MP 92.

ZONE UA BTU/HR-F 387.0

BEACON Energy Analysis By EMC Engineers, Inc. 637BFG.I

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

FAN TOTAL INTERNAL INTERNAL SPACE COIN-TEMPERATURE F CIDENT HEAT GAIN LIGHTING PROCESS HEAT CIDENT THOUSAND MILLION MILLION MILLION MONTH AVG. MAX MIN DAY HR AMBT. KWH BTU BTU BTU 16 55. 1.22 2.07 11.45 JAN 70. 76. 2 7.69 69. 27 7 4. 26 6.89 1.87 10.28 FEB 71. 78. 15 59. 1.10 69. 2 7 14. 71. 78. 25 16 58. 7.62 2.07 MAR 1.21 11.37 69. 4 6 15. 2.01 APR 73. 80. 3 17 58. 1.17 7.36 10.98 70. 6 29. 14 MAY 75. 82. 10 16 55. 1.22 7.69 2.07 11.45 70. 5 39. 11 JUN 27 1.17 7.36 2.01 10.98 75. 76. 13 88. 70. 17 6 57. JUL 75. 76. 16 13 91. 1.21 7.62 2.07 11.37 72. 10 6 60. 14 87. 1.22 2.07 AUG 75. 76. 30 7.69 11.45 70. 25 7 55. 30 16 54. 1.16 7.29 2.01 10.90 SEP 74. 76. 70. 15 6 39. 15 59. 1.22 7.69 2.07 OCT 73. 81. 24 11.45 70. 28 5 31. NOV 71. 77. 9 15 51. 1.18 7.42 2.01 11.06 69. 3 7 18. DEC 70. 76. 12 16 59. 1.20 7.56 2.07 11.29 69. 18 7 -1.

14.32

89.87

24.43

134.07

YEAR

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHE	MUMIXAM N	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BT	
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	643	16	0	0	9433E+05	.2853E+05
FEB	524	13	0	0	7564E+05	.4029E+05
MAR	474	54	0	0	7885E+05	.4023E+05
APR	232	190	0	0	4470E+05	
MAY	58	359	0	0	2862E+05	.5112E+05
JUN	0	547	0	0		.6722E+05
JUL	0	661	0		.0000	.8050E+05
AUG	2	656	-	0	.0000	.8890E+05
SEP	84		0	0	-5328.	.8238E+05
		448	0	0	2792E+05	.8312E+05
OCT	226	186	0	0	4212E+05	.6312E+05
NOV	415	81	0	0	6173E+05	.4708E+05
DEC	651	9	0	0	9607E+05	.1453E+05
YEAR	3309	3220	0	0	9607E+05	.8890E+05

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	TION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	11.40	.04	1.22	7.69	.61	11.45	7.9
FEB	8.92	.03	1.10	6.89	.55	10.28	9.1
MAR	7.65	.15	1.21	7.62	.61	11.37	9.0
APR	3.48	.60	1.17	7.36	.59	10.98	10.0
MAY	.87	1.29	1.22	7.69	.61	11.45	11.3
JUN	.00	2.39	1.17	7.36	.59	10.98	12.3
JUL	.00	3.10	1.21	7.62	.61	11.37	12.9
AUG	.03	2.92	1.22	7.69	.61	11.45	12.4
SEP	1.26	1.85	1.16	7.29	.59	10.90	12.2
OCT	3.39	.58	1.22	7.69	.61	11.45	11.0
NOV	6.33	.21	1.18	7.42	.59	11.06	9.7
DEC	11.92	.01	1.20	7.56	.61	11.29	5.7
YEAR	55.26	13.18	14.32	89.87	7.16	134.07	12.9

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 82595. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-1 INSTALL FIBERGLASS INSULATION

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					HOUR	S WHEN	MUMIXAM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/		AMBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL		BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	_				210
					•					
JAN	1074.	696.	1.000	35.	0.	Ο.	0	0	28535+05	9433E+05
			2.000		٠.	٠.	Ū	Ū	.20555405	94335+03
FEB	1494.	948.	1.000	37.	0.	Ο.	0	0	4020E+0E	7564E+05
		,,,,,	1.000	57.	٥.	٥.	U	U	.40296405	/5046+05
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	40418.05	70057.05
		1205.	1.000	43.	0.	0.	U	U	.40416+05	7885E+05
APR	2323.	1608.	1.000	55.	•	^	•	_		
APK	2323.	1606.	1.000	55.	0.	0.	0	0	.5112E+05	4470E+05
MAY	2570.	1000	1 000	~ =	•	_	_	_		
MAI	2570.	1829.	1.000	65.	0.	0.	0	0	.6722E+05	2862E+05
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.8050E+05	.0000
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.8890E+05	.0000
AUG	2291.	1849.	1.000	76.	0.	0.	0	0	.8238E+05	-5328.
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.8312E+05	2792E+05
OCT	1467.	972.	1.000	57.	0.	0.	0	0	.6312E+05	4212E+05
NOV	1071.	754.	1.000	47.	0.	0.	0	0	.4708E+05	6173E+05
DEC	916.	627.	1.000	35.	0.	0.	0	0	.1453E+05	9607E+05

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BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 7.500000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
                              1.000000
SKY CLEARNESS FACTOR (CLN)
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 29753.000000
FLOOR AREA (SQFT) 3189.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 120000.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -180000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 31890.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 215.000000
INFILTRATION PROFILE
 1.00 1.00 1.00
                              1.00 1.00
                                                   1.00 1.00

    1.00
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A FACTOR IN INFILTRATION EQUATION (CINA) 4.340000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 13970.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 182.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 29.000000
                            30
WINDOW GLASS NUMBER (NG)
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                  WALL DATA
                                   1 2
                                                     3
WALL NUMBER
                                             90.00
                                                      180.00
AZIMUTH ANGLE (AZ)
                                   .00
                                                                 -90.00
WALL AREA SQFT (AWLL) .0 929.0 358.0 8
WINDOW AREA SQFT (AWND) .0 42.3 .0 1
WINDOW HEIGHT FT (WNDH) .0 10.0 .0
WINDOW WIDTH FT (WNDW) .0 4.2 .0
WIDTH OF OVERHANG (WOH) .0 .0 .0
OVERHANG HGT ABV WNDW (HOH) .0 .0 .0
                                          929.0 358.0
                                                                 822.0
                                                                106.0
                                                                10.0
                                                                 10.6
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MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS CN FACTORS NUMBER OF BN FACTORS (NB BN FACTORS BN (BN)	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND)	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	*****	******	*****	******
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=1 N=2 N=3 N=4 N=5	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	.00613 00002	00002
ROOF AREA SQFT (AROF) 3189	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 4.11	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	6.0474	39E-03		
ROOF B TRANSFER FUNCTIONS (BNR				
.185E-05 .509E-03 .294E-02		.305E-03	.648E-05	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.33 .558			999.	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.0	000000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO				
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S				
SUMMER START MONTH AND DAY FOR				
SUMMER END MONTH AND DAY FOR SI SKY LIGHT AREA SQFT (ASKY)	ASK (MND, N.	DND)	1	1
DAYTIME SKY LIGHT U BTU/SQFT-HI	0.000000E+	1		
NIGHT TIME SKYLIGHT U BTU/SQFT-	THD-E (GKAI -E (BVIO)	T.	494330 1 20200	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAD)	£ 300000	E-01
01 1100000 11211 10 1N		~~ (L FAL /	3.300000	⊔ ∨ ±

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					FOINI D	EG F
	KW -		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	4.	38839.	1225.	775.		
HOUR	HC	URLY FRACT	CION OF PEA	AK		
1	.100	.100	.000	.000	70.0	75.0
2	.100	.100	.000	.000	70.0	75.0
3	.100	.100	.000	.000	70.0	75.0
4	.100	.100	.000	.000	70.0	75.0
5	.100	.100	.000	.000	70.0	75.0
6	.100	.100	.000	.000	70.0	75.0
7	.100	.100	.000	.000	70.0	75.0
8	1.000	.400	1.000	1.000	70.0	75.0

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                                                                                            75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
                                                                   60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 4785.000000
ECONOMIZER HIGH TEMP LIMIT F 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.00000
SYSTEM SUPPLY AIR STOP TIME HR 55.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
                                                  24.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 0.000000E+00
FAN EFFICIENCY (EFAN)
                                5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 120000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 150000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                                                        .710
 .420
              .100 .560
                                      .200 .650 .300
                                                                                                      .400
 .740
                .500
                             .750
                                            .600
                                                          .760
                                                                         .700
                                                                                       .780
                                                                                                      .800
 .790
               .900
                              .800
                                            1.00
CHILLER TYPE (ITYPCH)
                                            3
COOLING PLANT RATED OUTPUT BTU (CFLOT) 180000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)
                                                         46075.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                                   .000
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BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTIT DOOR AND				VENT AND	
MNTH	LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	.34	GAIN	2.09	.00	.00	.00	.00	.00	.00	.09
	-22.99	LOSS		-3.82		.00	-2.48	-2.07		.00
FEB	.27	GAIN	2.68	.00	.00	.00	.00	.00	.00	.04
	-17.86	LOSS			-4.77	.00	-1.87	-1.77	-19.02	.00
MAR	1.30	GAIN	3.32	.02	.00	.00	.03	.00	.00	.10
		LOSS	• • • •		-4.44		-1.39			.00
ממא	5.35	GAIN	3 54	13	.03	0.0	.21	01	. 11	.55
APR		LOSS			-2.63		58			
	-5.10	TOSS		-1.69	-2.03	.00	50	. , 0	3.33	
MAY	11.64	GAIN	3.88	.33	.11	.00	.57	.04	.30	2.05
		LOSS		-1.03	-1.53	.00			-4.61	
TTTN	22.43	GAIN	3 89	.56	.31	.00	1.03	.11	.88	7.99
UUN	.00		3.05		67		.00	24	-1.87	.00
JUL	29.42	GATN	4 01	. 85	. 73	.00	1.42	.27	2.21	10.60
JUL		LOSS	1.01		40	.00	.00			
AIIC	27.36	CAIN	3 52	68	.56	0.0	1.18	. 20	1.58	10.39
AUG	01		3.32		44		.00	16	-1.22	.00
SEP	17.23	GAIN	3.01	.31	.28	.00			.91	
	-1.23	LOSS		88	-1.18	.00	15	43	-3.74	.00
OCT	5.17	GAIN	2.50	.06	.04	.00	.09	.02	.13	1.00
	-4.21				-2.55		74	92	-8.29	.00
NOV	1.86	GAIN	1.95		.00		.00			
	-10.28	LOSS		-2.56	-3.64	.00	-1.46	-1.32	-12.76	.00
DEC	. 08	GAIN	1.78	.00	.00	.00	.00	.00	.00	.00
	-22.04				-5.49		-2.53	-2.01	-21.22	.00
ጥርጥ	122	GAIN	36.	3.	2.	0.	5.	1.	6.	39.
101	-98.			-23.	-33.	0.	-11.	-12.	-123.	0.
	•									
MAX	HEATING	LOAD=	- 9	5219.	BTUH ON	DEC 18	HOUR 7	AME	BIENT TE	MP -1.
MAX	COOLING	LOAD=	8	8606.	BTUH ON BTUH ON	JUL 13	HOUR 14	AME	BIENT TE	MP 90.

ZONE UA BTU/HR-F 368.0

BEACON Energy Analysis By EMC Engineers, Inc. 637BRGD.I

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

									FAN TO	TAL
INTERN		RNAL	SPACE		c	COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
MONTH			URE F MIN			CIDENT AMBT.	THOUSAND KWH	MILLION BTU	MILLION BTU	MILLION BTU
NAL	70.	76.	69.	2 27			1.22	7.69	2.07	11.45
FEB	71.	78.	69.	26 2			1.10	6.89	1.87	10.28
MAR	71.	78.	69.	25 4			1.21	7.62	2.07	11.37
APR	73.	80.	70.	3 14		58. 29.	1.17	7.36	2.01	10.98
MAY	74.	82.	70.		16 5		1.22	7.69	2.07	11.45
JUN	75.	76.	70.			88. 57.	1.17	7.36	2.01	10.98
JUL	75.	76.	72.		13 6	-	1.21	7.62	2.07	11.37
AUG	75.	76.	70.		14 6		1.22	7.69	2.07	11.45
SEP	74.	76.	70.		16 6		1.16	7.29	2.01	10.90
OCT	73.	81.	70.	24 28	15 5	59. 31.	1.22	7.69	2.07	11.45
NOV	71.	77.	69.	9 3	15 7		1.18	7.42	2.01	11.06
DEC	70.	76.	69.	12 18	16 7		1.20	7.56	2.07	11.29

YEAR

14.32 89.87 24.43 134.07

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
JAN	641	16	0	0	9376E+05	.2876E+05
FEB	519	13	0	0	7504E+05	
MAR	469	54	0		· 	.4151E+05
APR	228		_	0	7832E+05	.4051E+05
		190	0	0	4442E+05	.5106E+05
MAY	60	355	0	0	2853E+05	.6698E+05
JUN	1	542	0	0	-958.6	.8022E+05
${ m JUL}$	0	657	0	0	.0000	.8861E+05
AUG	2	648	0	Ö	-6314.	
SEP	84	443	0			.8213E+05
OCT	223		•	0	2778E+05	.8286E+05
		185	0	0	4185E+05	.6309E+05
NOV	409	81	0	0	6113E+05	.4719E+05
DEC	649	9	0	0	9522E+05	.1500E+05
YEAR	3285	3193	0		9522E+05	.8861E+05

SYSTEM TOTALS

			Y CONSUMPT			OTAL INTERNAL	
	HEATING MILLION	COOLING THOUSAND	LIGHTING THOUSAND	PROCESS MILLION	FANS THOUSAND	HEAT GAIN MILLION	ELECTRIC DEMAND
MONTH		KWH	KWH	BTU	KWH	BTU	KW
JAN	11.26	.04	1.22	7.69	.61	11.45	8.0
FEB	8.79	.03	1.10	6.89	.55	10.28	. 9.2
MAR	7.55	.15	1.21	7.62	.61	11.37	9.0
APR	3.42	.60	1.17	7.36	.59	10.98	10.0
MAY	.90	1.28	1.22	7.69	.61	11.45	11.3
JUN	.02	2.37	1.17	7.36	.59	10.98	12.3
JUL	.00	3.07	1.21	7.62	.61	11.37	12.8
AUG	.03	2.89	1.22	7.69	.61	11.45	12.4
SEP	1.26	1.83	1.16	7.29	.59	10.90	12.2
OCT	3.35	.58	1.22	7.69	.61	11.45	11.0
NOV	6.23	.22	1.18	7.42	.59	11.06	9.7
DEC	11.73	.01	1.20	7.56	.61	11.29	5.9
YEAR	54.53	13.08	14.32	89.87	7.16	134.07	12.8

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 82262. BTU/(SQFT-YEAR)

BLDG 637 - CHAPEL OFFICE AREA - ZONE 2 ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.						100		
MONTH	HORIZ. SURF. BTU/ SQFT-		PF FACTOR	AVG. AMBT. DEG. F	MAX SYSTEMP. DEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1074.	696.	1.000	35.	0.	0.	0	0	.2876E+05	9376E+05
FEB	1494.	948.	1.000	37.	0.	0.	0	0	.4151E+05	7504E+05
MAR	1944.	1269.	1.000	43.	0.	0.	0	0	.4051E+05	7832E+05
APR	2323.	1608.	1.000	55.	0.	Ο.	0	0	.5106E+05	4442E+05
MAY	2570.	1829.	1.000	65.	0.	Ο.	0	0	.6698E+05	2853E+05
JUN	2646.	1993.	1.000	72.	0.	0.	0	0	.8022E+05	-958.6
JUL	2549.	2018.	1.000	77.	0.	0.	0	0	.8861E+05	.0000
AUG	2291.	1849.	1.000	76.	0.	Ο.	0	0	.8213E+05	-6314.
SEP	1878.	1388.	1.000	68.	0.	0.	0	0	.8286E+05	2778E+05
OCT	1467.	972.	1.000	57.	0.	Ο.	0	0	.6309E+05	4185E+05
NOV	1071.	754.	1.000	47.	0.	Ο.	0	0	.4719E+05	6113E+05
DEC	916.	627.	1.000	35.	0.	0.	0	0	.1500E+05	9522E+05

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORMATION	:						
Building No: 637		Building Name:	Chapel				to the state of th
Surveyed by: AJN		Date:	11/6/95		Building Use:	Church Assembly	/ Offices
Building Conta Staff Sgt. V	Villiams				Phone No:	596-0182	
Building Contact:					Phone No:		_
OCCUPANCY:							-
Number of Employees:	Mon./Fri.:	5		Schedule:	830	То	1700
	Tues./Thurs	5			830	То	1700
	Wed.	5			830	То	1700
	Sat./Sun.	5			630	То	1230
Visitors Per Day:	Mon./Fri.:			Schedule:		То	
	Tues./Thurs.					То	
	Wed.					То	
	Sat./Sun.	100			700	То	1230
Comments:	·						
LIGHTING SCHEDULE:							
Normal Occupancy:	MonFri.:			Schedule:	830	То	1700
	Sat./Sun.:				630	То	1230
Cleaning Crew/2nd Shift:	MonFri.:			Schedule:		То	
	Sat./Sun.:					То	
EQUIPMENT SCHEDULE:							
Fan/AHU Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:	·			0	То	2400
Chiller Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Boiler Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Aux. Equipment Schedule:							
	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 637 Building Name: Chapel

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING ENVELOPE

		EXTERIOR WALLS		IST OF EXT. WALL CONSTRUCTION TYPES
Wall Direction (N	Wall Construction			
E, W, or S		Comments	Wall Construction	1
····		Comments	No.	Description
N -	XW-1		XW-I	Face Brick & CMU
Е	XW-1		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-1		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-1		XW-4	Face Brick, CMU, & Plaster Coat
			XW-S	Insulated Metal Panel
Mindow	Window	WINDOWS		LIST OF WINDOW TYPES
Window Direction (N	Construction			
E, W, or S)	No.	Comments	Window Construction No.	.
N	W-1	Comments	<u> </u>	Description
E	W-1		W-1	Double Pane Clear
S	W-1		W-2	Double Pane Tinted
			W-3	Single Pane with Storm Windows
W	W-1		W-4	Single Pane
	R	COOF CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
	Roof			FISH OF WOOL CONSTRUCTION TIPES
Roof	Construction		Roof Construction	
Location	No.	Comments	No.	Description
Admin. Area			R-I	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
ALL	R-6	The 6" insulation consists of 3" fiberglass batt and 3" blown cellulose.	R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceilir Tile
Santuary			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
ALL	R-7		R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaste Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceilin Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Hard Board
			R-7	Asphalt Shingles, Rigid Insulation, Wood Decking

EMC Engineers, Inc.

Building No

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building Name: Chapel

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INTE	RIOR EQUI	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall Direction (N,					
E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
000					Architectural
Office Area				A-1	Interior Partitions
W	M-5	3		A-2	Wall Placards
V	E-2	2	- Professional Control of the Contro	A-3	Drapery Valances
N	M-5	5		A-4	Drapery Rods
N	A-4	5		A-5	Speakers
N	E-3	1	3100	A-6	Cabinets
	E-2			A-7	Wall Cabinet
S	E-2	2		_	Plumbing
s	P-1	1		P-1	Sinks
S	A-4	4		P-2	Commodes
S	M-5	6		P-3	Toilet Stalls
S	A-6	1		P-4	Water Fountains
S	P-2	2		_	
S	A-7	1			HVAC Mechanical
			Glazed structural block in kitchen area	M-I	Floor Supply/Return Grilles
			approx. area 15'x10'.	M-2	Ceiling Supply/Return Grilles
			Glazed structural block 5'-0" A.F.F. in	M-3	Finned-Tube Baseboard Radiators
			latrine.	M-4	Thermostats / Space Temp. Sensors
antuary Area				M-5	Fan Coil Unit
W	A-4	3			
					Electrical
N N	M-1 A-5	4 2		E-I	Electrical Panels
N	A-5 A-4			E-2	Electrical Outlets
N	A-2	4 6		E-3	Electrical Light Switches
	M-2			E-4	Wall Mounted Television
E	A-5	2			
E	A-2	6		-	
E	M-1	8		-1	Lighting
E	E-3	1		L-I	Wall Mounted Fixtures
E	A-4	8		1-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
		i			
				1	
					Fire Protection
				F-I	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
				<u> </u>	Communication
				(-)	Telephones - Wall Mounted
				(-2	Telephones - Booth Mounted
				C-3	Telephone Jacks
				11	

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

IN. FT. LEUNAND WOOD

BLDG:

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96 **DMS**

AJN

CHECKED BY:
FILE: 637AH1

	AIR HANDLING UN	IT SURVEY OBSERVATIONS	
AHU-1	AHU NO.	MECH. ROOM	LOCATION (RM)
CH-1	REF. SYS. SERVING AHU	CHAPEL SANCTUARY (ZN1)	SERVES AREA

637

			UNIT TYP	E:		
х	SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	H&∨	
	MULTIZONE	DOUBLE DT	REHEAT	INDUCTION	VAV	
	NUMBER OF ZONES		OTHER			·
	COMMENT:		•			

UNHAM-	BUSH				MFG.		VAH603			MODEL
10.0	10.0 SUPPLY FAN HP NO NAME PLATE				MFG.					MODEL
	RET/EXH FAN HP			_	MFG.				<u> </u>	MODEL
6970	CFM-HTG	6970	CFM-CLG	10%	MIN %OA	100%	MAX %OA	100%	% HTG AREA	SERVED

					COILS:				
Х	NONE		STM		HW	ELEC		MOD VLV	PREHEAT
	NONE		STM	х	нw	ELEC	x	MOD VLV	HEATING
х	NONE		STM		HW	ELEC		MOD VLV	REHEAT
х	NONE		STM		нw	ELEC		MOD VLV	HUMID.
	NONE	х	DX		cw		х	MOD VLV	COOLING

				(PERATI	ON:					
HOURS	ON:		s	м	т	w	т	F	S	COMMENTS	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES,	******
REQUIRED	START TIME									NO PINS	****
REQUIRED	STOP TIME					1					
MONTHS	S ON:					 	L.	I	-	L	
J	F	М	Α	м	J	J	Α	s	0	N	D
1	1	1	1	1	1	1	1	1	1	.1	1

				CONTRO	LS:				
	х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK	1		PNEUMATIC
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	ACTUATORS
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Υ	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Υ	YES		NO				***	
COMMENTS:									<u> </u>

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011 DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY: AJN

637FC1 FILE:

	BLDG:	637	FILE:	637FC1
	AIR HANDLING UNIT	SURVEY OBSE	RVATIONS	
FC-1	AHU NO.	OFFICE AREA (2	ZN2)	LOCATION (RM)
CH-2	REF. SYS. SERVING AHU	OFFICE AREA (EN2)	SERVES AREA

			UNIT TYP	E:		
 SINGLE ZN	х	2-PIPE FC	4-PIPE FC	UNIT HTR	H&V	
MULTIZONE		DOUBLE DT	REHEAT	INDUCTION	VAV	
 NUMBER OF ZON	NES		OTHER			
 COMMENT:						

					I				
DUNHAM-	BUSH				MFG.	NO NAME PLAT	Έ		MODEL
2.3	SUPPLY FAN H	P			MFG.			MODEL	
0.0	RET/EXH FAN I	HP			MFG.			MODEL	
4785	CFM-HTG	4785	CFM-CLG	0%	MIN %OA	MAX %OA	100.0%	% HTG AREA	SERVED
COMMENT	 Γ:	TOTAL CF	M FOR ALL FAN	COILS: TV	VO-PIPE FAN COIL	IN EACH ROOM;			

	<u> </u>			COILS:											
×	NONE	STM		нw	ELEC	MOD VLV	PREHEAT								
	NONE	STM	х	нw	ELEC	MOD VLV	HEATING								
х	NONE	STM		нw	ELEC	MOD VLV	REHEAT								
х	NONE	STM		HW	EVAP MEDIA	MOD VLV	HUMID.								
	NONE	DX	х	cw		MOD VLV	COOLING								

					OPERAT	ION:				-	
HOURS C	N:		S	М	Т	w	Т	F	S	COMMENTS	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	NO
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400	CONTROLLED	ВҮ
REQUIRED S	START TIME									OCCUPANT	
REQUIRED S	STOP TIME										
MONTHS	ON:										
J	F	м	Α	М	J	J	A	S	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

			CONTROLS	3:		
	PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:	SINGLE STPT		DUAL SETPNT	SETBACK		
SPACE SETPOINT (°F):	OCC HEAT		UNOCC HEAT	OCC COOL	UNOCC COO	L
OTHER SETPOINTS (°F):	HOT DECK		COLD DECK	MIXED AIR	OTHER	
DAMPER CONTROL:	MIN OA (Y/N)		MAX OA (Y/N)	RA (Y/N)	EA (Y/N)	
	MA CONTROL		ECONO-DB	ECONO-ENT	OTHER	
DEMAND LIMIT:	YES	N	NO			
COMMENTS:						

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

.

DATE:

Feb-96

PREPARED BY:

EMC NO.: 1406-011

DMS

CHECKED BY: FILE:

AJN **637CH1**

REFR	REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS									
CH-1	CHILLER/COMPRESSOR NO.	OUTSIDE BLDG	LOCATION (RM)							

637

				UNIT T	YPE:			
	CENTRIFUC	GAL WITH WA	ATER SIDE COOL	ING TOWER		OTHER		
	RECIPROCA	ATING WITH	WATER SIDE CO	OLING TOWER	х	AHU'S SERVED	AHU-1	(ZN1)
х	RECIPROCA	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						
	ABSORBTIO	ABSORBTION WITH WATER SIDE COOLING TOWER						
	AIR COOLE	D CONDENS	NG UNIT					
	CHW	х	DX	OTHER				

	NAMEPLATE:												
CHILLER	McQUAY	MFG.	5	TO30A150	00	MODEL		5SC0803600		SERIAL NO.			
230	VOLTS	61.8	AMPS	3	PH	60	HZ	30	CAPACITY (TO	ONS)			
CONDENS	ER FANS	MFG.				MODEL			4	# OF FANS			
230	VOLTS	4	AMPS	3	PH	60	HZ	1	HP				
DTW PUM	P	MFG.				MODEL				SERIAL NO.			
	VOLTS	1	AMPS		PH		HZ		НР				
CNW PUM	P	MFG.				MODEL				SERIAL NO.			
	VOLTS		AMPS		PH		HZ		НР				
COMMENT	S:				-								

		(OPERATI	ON:					
HOURS ON:	s	М	Т	w	Т	F	s	COMMENT	
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO TIMECLOC	K
REQUIRED START TIME									
REQUIRED STOP TIME									
MONTHS ON:		·							
J F N	1 A	М	J	J	Α	s	0	N	D
0 0	0 0	1	1	1	1	1	0	0	0

	PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	CWS (oF)		CWR (oF)	CNWS (oF)	CNWR (oF)	
PANEL INDICATORS						
- PRESSURE	LITE-HI		LITE-LOW	GAUGES		
- TEMPERATURE	LITE-HI		LITE-LOW	GAUGES		
- OTHER						
COMMENTS:						

EM C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96

CHECKED BY:

DMS

AJN

	BLDG:	637	FILE:	637CH2
REFRIC	GERATION EQUIPMENT	SURVEY OBSE	RVATIONS	
CH-2	CHILLER/COMPRESSOR NO.		OUTSIDE BLDG LO	CATION (RM)

637

			UNIT T	YPE:			
	CENTRIFUGAL	WITH WATER SIDE COOL	ING TOWER		OTHER		
	RECIPROCATIN	IG WITH WATER SIDE CO	OLING TOWER	x	AHU'S SERVED	FC-1	(ZN2)
X	RECIPROCATING WITH AIR COOLED CONDENSING UNIT						(2.02)
	ABSORBTION V	VITH WATER SIDE COOLI	NG TOWER				
	AIR COOLED C	ONDENSING UNIT	······································	 			
х	CHW	DX	OTHER	 			

CHILLER					IAWIA	EPLATE:				
JIDELEK -	McQUAY	MFG.		ALR020A		MODEL		5SC07141	100	SERIAL NO.
208 ∨	OLTS	80	AMPS	3	PH	60	HZ	20	CAPACITY (TO	
CONDENSER	FANS	MFG.				MODEL	ļ		3	# OF FANS
208 V	OLTS	4.4	AMPS	1	РН	60	HZ	0.75		# 01 17410
DTW PUMP MFG. NO NAME PLATE		MODEL				SERIAL NO.				
V.	OLTS		AMPS		РH		HZ	0.75		CETIFIC 10.
NW PUMP		MFG.			•	MODEL				SERIAL NO.
v	OLTS		AMPS		PH		HZ		HP	OZMAZ NO.

					OPERAT	ION:					
HOURS	ON:		s	М	Т	w	т	F	s	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0		TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400		NO TIMECLOC	у.
REQUIRED	START TIME								2400		· N
REQUIRED	STOP TIME										
MONTHS	S ON:				<u></u>						
J	F	М	Α	М	J	J	Α	s	0	N	D
0	0	0	0	1	1	1	1	1	0	,,	

	PNEUMATIC	X ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	CWS (oF)	CWR (oF)	CNWS (oF)	CNWR (oF)	
PANEL INDICATORS					
- PRESSURE	LITE-HI	LITE-LOW	GAUGES		
- TEMPERATURE	LITE-HI	LITE-LOW	GAUGES		-
- OTHER					
COMMENTS: HA	S FM SWITCH AND FLOW	SWITCH			

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

637

EMC NO.: 1406-011

DATE:

FILE:

Feb-96

PREPARED BY: CHECKED BY: DMS AJN

ову: А. 637CV1

	BOILER & CONVERTER SURVEY OBSERVATIONS									
CV-1	BOILER/CONVERTER NO.	MECH. RM.	LOCATION (RM)							
C. PLANT	SOURCE OF HEATING (PLANT)	CHAPEL SANCTUARY (ZN1)	SERVES AREA							

			UNIT TYPE			
х	STEAM	PSIG	HW	ТЕМР.		BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC		FUELS:
Х	STM/HW	HTHW/HW	HTHW/STM	OTHER	S&T	CONVERTER TYPE:
	SPACE HEAT	DHW	OTHER			USE:
ОММЕ	NT:			o	% HTG A	REA SERVED
					BB RADIA	ATION ONLY

			NAMEPLATE:	· · · · · · · · · · · · · · · · · · ·	1	
NO NAME PLATE	MFG.		MODEL	475000	CAPACITY OUTPL	JT (BTUH)
				475000	CAPACITY INPUT	(BTUH)
	MFG.		MODEL		CAPACITY OUTPL	IT (BTUH)
					CAPACITY INPUT	(BTUH)
1 HW PU	MP 1 - HP	CENTURY	MFG.	NO NAME PLA	TE	MODEL
HW PU	MP 2 - HP		MFG.			MODEL
1 COND.	PUMP - HP	DAYTON	MFG.	NO NAME PLA	TE	MODEL

				C	PERATI	ON:			·		
HOURS O	N:		s	м	т	w	т	F	s	COMMENT	11.1.1
PRESENT ST	ART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT ST	OP TIME		2400	2400	2400	2400	2400	2400	2400	NO TIMECLOC	K
REQUIRED S	TART TIME		111				····		****		
REQUIRED S	TOP TIME									i	
MONTHS	ON:					 			-7.11	L	
J	F	м	Α	м	J	J	A	s	0	N	D
1	1	1	1	0	0	0	0	0	1	1	<u> </u>

	x	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS		PSIG	HW SUPPLY			77
RESET CONTROL (oF):		HW HIGH	HW LOW	OA LOW	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)	OTHER			

EMC ENGINEERS, INC.

LOCATION: FT. LEONARD WOOD

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY:

AJN

BLDG:

FILE: 637CV2

EMC NO.: 1406-011

	BOILER & CONVERTE	R SURVEY OBSERVATION	IS
CV-2	BOILER/CONVERTER NO.	MECH. RM.	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	OFFICE AREA (ZN2)	SERVES AREA

637

			UNIT TYPE	:		
х	STEAM	PSIG	HW	TEMP.		BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC		FUELS:
Х	STM/HW	HTHW/HW	HTHW/STM	OTHER	S&T	CONVERTER TYPE:
	SPACE HEAT	DHW	OTHER			USE:
СОММЕ	NT: EXP	. TANK IS WATER LOGGE	D	O	% HTG A	REA SERVED
	DUAL TEMPER	ATURE SYSTEM			BB RADIA	ATION ONLY

		V	IAMEPLATE:			
NO NAME	PLATE	MFG.	MODEL	120000	CAPACITY OUTPUT (E	BTUH)
				120000	CAPACITY INPUT (BT	UH)
	***************************************	MFG.	MODEL		CAPACITY OUTPUT (E	зтин)
					CAPACITY INPUT (BT	UH)
0.75	HW PUMP 1 -	HP NO NAME PLATE	MFG.			MODEL
	HW PUMP 2 -	HP	MFG.			MODEL
	COND. PUMP	- HP	MFG.			MODEL
COMMENT	Γ:	PUMP AND CONVERTER ARE VERY OLD)			

				C	PERATI	ON:					
HOURS	ON:		s	М	Т	w	т	F	S	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	NO TIMECLOCI	(
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTH	S ON:									<u> </u>	
J	F	М	Α	м	J	J	Α	s	0	N	D
1	1	1	1	0	0	0	0	0	1	1	1

	X	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS		PSIG	HW SUPPLY			
RESET CONTROL (oF):		HW HIGH	HW LOW	OA LOW	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)	OTHER			
COMMENTS:		***************************************				

ANNUAL ENERGY SAVINGS SUMMARY FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
630	133.11	124.44	8.67	44.20	42.70	1.50	2815.03	2682.02	133.01

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 630	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
632	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
653	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
657	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
735	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
739	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
749	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
754	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
820	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
821	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
836	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
837	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
1010	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
1011	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01
1027	13,280	13,280	1.000	8.67	8.67	1.50	1.50	133.01	133.01

^{*}Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak			Annual
		ECO 2 -				Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	~ .
630	133.11	124.03	9.08	44.20	42.70	1.50	2815.03	2676.19	

				1	·		T		
				ļ.	Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 630	ment	Savings	Savings*	Savings	Savings*		Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
632	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
653	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
657	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
<i>7</i> 35	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
739	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
749	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
754	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
820	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
821	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
836	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
837	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
1010	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
1011	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84
1027	13,280	13,280	1.000	9.08	9.08	1.50	1.50	138.84	138.84

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
630	\$54,215

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 630	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
632	13,280	13,280	1.000	\$54,215	\$54,215
653	13,280	13,280	1.000	\$54,215	\$54,215
657	13,280	13,280	1.000	\$54,215	\$54,215
735	13,280	13,280	1.000	\$54,215	\$54,215
739	13,280	13,280	1.000	\$54,215	\$54,215
749	13,280	13,280	1.000	\$54,215	\$54,215
754	13,280	13,280	1.000	\$54,215	\$54,215
820	13,280	13,280	1.000	\$54,215	\$54,215
821	13,280	13,280	1.000	\$54,215	\$54,215
836	13,280	13,280	1.000	\$54,215	\$54,215
837	13,280	13,280	1.000	\$54,215	\$54,215
1010	13,280	13,280	1.000	\$54,215	\$54,215
1011	13,280	13,280	1.000	\$54,215	\$54,215
1027	13,280	13,280	1.000	\$54,215	\$54,215

^{*}Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY

FOR MESS HALL's - BUILDINGS 630, 632, 653, 657, 735, 739, 749, 754, 820, 821, 836, 837, 1010, 1011, & 1027

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
630	\$55 <i>,7</i> 48

			Cauara		
i		ł	Square		
ı			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 630	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
632	13,280	13,280	1.000	\$55,748	\$55,748
653	13,280	13,280	1.000	\$55,748	\$55,748
657	13,280	13,280	1.000	\$55,748	\$55,748
735	13,280	13,280	1.000	\$55,748	\$55 <i>,</i> 748
739	13,280	13,280	1.000	\$55,748	\$55,748
749	13,280	13,280	1.000	\$55,748	\$55,748
754	13,280	13,280	1.000	\$55,748	\$55 <i>,</i> 748
820	13,280	13,280	1.000	\$55,748	\$55,748
821	13,280	13,280	1.000	\$55,748	\$55,748
836	13,280	13,280	1.000	\$55,748	\$55,748
837	13,280	13,280	1.000	\$55,748	\$55,748
1010	13,280	13,280	1.000	\$55,748	\$55,748
1011	13,280	13,280	1.000	\$55,748	\$55,748
1027	13,280	13,280	1.000	\$55,748	\$55,748

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

		LOCATION:	Fort Leonard	l Wood	REGION: 2 (Missour	ri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Ener	gy Study, Insu	late Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
	IND.	ECTAFAIT.	BIDC 620	MICTALL 2 E	' EIDEDCI ACC DATT	INICHI ATION ON	MALLE	
1.		ESTMENT: CONSTRUCTION COS		iNSTALL 3.5	' FIBERGLASS BATT	INSULATION ON	\$47,978	
	A. B.	SIOH COST		= = (0% of 1A)			\$3,358	
		DESIGN COST	·	.0% of 1A) =			\$2,879	
		TOTAL COST		+1B +1C) =			\$54,215	
	E.		•				\$04,215	
		PUBLIC UTILITY COM					\$0	
		TOTAL INVESTMENT		ID -1E -1F) =			>	\$54,215
2.		RGY SAVINGS (+) OR E OF NISTIR 85-3273-		R DISCOUNT I	FACTORS:	JAN '96		
	D A.	ENERGY	FUEL COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
!		SOURCE		MBTU/YR (2)		FACTOR (4)	SAVINGS (5)	
	Δ	ELECT.	\$7.33	8.67	\$64	13.80		
	В.	DIST	\$0.00	0.07	\$0	0.00		
		NAT GAS	\$5.30	133.01	\$705	17.76		
		COAL	\$0.00	0	\$0	0.00	•	
		ELEC. DEMAND		•	\$111	13.47		
	F.	TOTAL		141.68	\$880		>	\$14,896
3.	иои	I-ENERGY SAVINGS (+) OR COST (-)				
	A.	ANNUAL RECURRING	(+/-)	4				
		1 ANNUAL MAINTEN	ANCE		\$0		\$O	
		2			\$0		\$0	
		3			\$ O		\$0	
		4 TOTAL ANNUAL DI	SC. SAVINGS	S (+) / COST	\$0		\$0	
	В.	NON-RECURRING (+/-)					
		ITEM		SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
				COST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)	
						(TABLE A-2)		
		a. BASELINE EQUIP. RE	PLCMNT.				\$0	
		b.					\$0	
		c.					\$0	
		d.					\$0	
		e.					\$0	
		f. TOTAL		\$0			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+) OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	T YEAR DOLLAR SAVI	NGS (+) / CC	OSTS (-)	(2	2F3 + 3A4 + (3Bf1/E	conomic Life))	\$880
5.	SIM	PLE PAYBACK (SPB) IN	YEARS (MUS	ST BE < 10 YI	EARS TO QUALIFY)	(1G/4) =		61.62
6.	тот	AL NET DISCOUNTED	SAVINGS			(2F5 + 3C) =		\$14,896
7.	DISC	COUNTED SAVINGS-TO	-INVESTMEN	T RATIO (SIR)		(6/1G) =		0.27
		(MUST HAVE SIR > 1	.25 TO QUAL	IFY)				

ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	,		
PROJECT	L	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood. MO	eonard Wo	od. MO			DATE DEEDABED	- LEVEL	5	- 00
ENGINEER	i.R	neers, Inc.					ESTIMATOP	EL ANCO	181	18-rep-96
		Denver, CO					CHECKED BY	JR BY	O A	D. SINZ A Niemever
	10 mol	:		MA	MATERIAL COS	ST		ABOR COST		
S S	Code	Item Description	Unit of Measure	, disperient	Unit	Total	Crew/	Hours/		
-		BUILDING 630	INCASOR	Guannity	Cost	lotal	Worker	Cuit	Total	TOTAL
2		INSTALL 3.5" BATT INSULATION ON WALLS								
က										
4	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	6971.0	\$0.18	\$1.264	1-CARP	0.007	\$1.282	\$2 E46
2	٥	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	6971.0	\$0.20	\$1,397	2-CARP	0.007	\$6.227	\$7,624
0 1	WS	INSTALL 2"x4" STUDDED WALL 2" OC	L.F.	4299.0	\$0.24	\$1,013	F-2	0.00	\$2.132	\$3 145
~ α	P12////	DEI OCATE 12: PACTEONES ESTITION DRYWALL	S.F.	6971.0	\$0.07	\$465.52	1-PORD	0.01	\$1,683	\$2,148
σ	ROAWMH	DELOCATE 24' BASEBOARD RADIATION	Ë	2.0	\$18.39	\$36.79	Q-6	5.25	\$918	\$955
5	REWAN	RELOCATE & BASEBOARD RADIATION	ËA.	4.0	\$18.39	\$73.57	Q-6	5.68	\$1,987	\$2,061
=======================================	REB	RELOCATE ELECTRICAL MINISTRALION	EA.	2.0	\$18.39	\$36.79	9-0	4.68	\$819	\$855
12	REI	PELOCATE ELECTRICAL JUNCTION BOX	: E	2.0	\$7.82	\$15.65	1-ELEC	1.3	\$79	\$95
1 6	REO	RELOCATE ELECTRICAL OLITICAL	: E	0.	\$0.00	\$0.00	1-ELEC	3.25	66\$	66\$
14	RFF	RELOCATE ELECTRICAL UNILEI	<u>ا</u> لا	2.0	\$7.97	\$15.93	1-ELEC	0.896	\$55	\$20
, r.	Z K	RELOCATE LABOR MITCHEN CHIL	ا ز ک	1.0	\$0.00	\$0.00	1-CARP	0.2	\$5	\$5
16	RSD	RELOCATE CAAD DISDENICED	≦ i	2.0	\$71.07	\$142.15	Q 1-7	16.751	\$1,887	\$2,030
17	T.R.	RELOCATE TUEDANOCTAT	Δi	1.0	\$0.00	\$0.00	1-CARP	0.7	\$18	\$18
- 18	RTS	RELOCATE TOUR ET STALL	Ę.	1.0	\$0.00	\$0.00	1-ELEC	1.7	\$52	\$52
9		RELOCATE 10" HM & CW DOMESTIC PIPING	E E	2.0	\$0.00	\$0.00	2-CARP	3.536	\$372	\$372
20			i E	1.0	\$25.05	\$25.05	Ģ	4.546	\$256	\$281
27	RWTC	RELOCATE WATER CLOSET	ا ا ک	2.0	\$0.00	\$0.00	1-CARP	0.654	\$34	\$34
22	Ī	7.00	EA.	2.0	\$35.83	\$71.66	Q-2	10.904	\$1,911	\$1,983
23	2	INSTALL 1/2" WATERBOOK BOD TABLE	. L	274.0	\$1.14	\$313.68	1-CARP	0.134	\$962	\$1,278
24	ī	INSTALL 5/8" WATERPRE BRO TABED & SANDE	. C	136.0	\$0.84	\$114.24	2-CARP	0.02	\$143	\$257
25	:	INSTALL CERAMIC TILE A 1/4" & A 1/4" TILE	, L	402.0	\$0.96	\$383.91	2-CARP	0.02	\$422	\$806
26			J.Y.	538.0	\$1.83	\$985.44	2-TILE	0.084	\$2,189	\$3,174
27		SUBTOTAL				4				
28	DIFF	DIEFICIII TI V EACTOR				\$0,354			\$23,536	\$29,889
29		SUBTOTAL			2%				\$1,177	\$1,177
3 .	PRO	DROFIT				\$6,354			\$24,712	\$31,066
3 (SIBTOTAL	:	-	10%	\$635			\$2,471	\$3,107
. 8	: HO		:	-		\$6,989			\$27,184	\$34,173
3 8	:	SIBTOTAL			17%	\$1,188			\$4,621	\$5,809
	CONT	CONTINGENCY	:			\$8,177			\$31,805	\$39,982
	CO	150		:	20%	\$1,635			\$6,361	\$7,996
						\$9,812			\$38,166	\$47,978

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

		LOCATION:	Fort Leonard		REGION: 2 (Missouri)		PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Energ				FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96	[ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INV	ESTMENT:	BLDG 630 - II	NSTALL 1.5" I	RIGID INSULATION O	N WALLS		
	Α.	CONSTRUCTION COS	ST	=			\$49,334	
	В.	SIOH COST	(7.0)% of 1A) =			\$3,453	
	C.	DESIGN COST	(6.0)% of 1A) =			\$2,960	
		TOTAL COST	(1A -	-1B +1C) =			\$55,748	
	E.	SALVAGE VALUE OF	EXISTING EQU	JIPMENT =			\$0	
	F.	PUBLIC UTILITY COM	IPANY REBATE	=			\$0	
	G.	TOTAL INVESTMENT	(1	D -1E -1F) =			>	\$55,748
2.	ENE	RGY SAVINGS (+) OF	COST (-):					
		TE OF NISTIR 85-3273		R DISCOUNT F	ACTORS:	<u>JAN '96</u>		
		ENERGY	FUEL COST	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
		SOURCE	\$/MBTU (1)	MBTU/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5)	' <u> </u>
	Α.	ELECT.	\$7.33	9.08	\$67	13.80	\$918	
	В.	DIST	\$0.00	0	\$0	0.00	\$0	
	C.	NAT GAS	\$5.30	138.84	\$736	17.76	\$13,069	
	D.	COAL	\$0.00	0	\$0	0.00	\$0	
	E.	ELEC. DEMAND			\$111	13.47		
	F.	TOTAL		147.92	\$914		>	\$15,486
3.		N-ENERGY SAVINGS (ANNUAL RECURRING 1 ANNUAL MAINTEI 2 3 4 TOTAL ANNUAL E	S (+/-) NANCE		\$0 \$0 \$0 \$0		\$0 \$0 \$0 \$0	
	В.	NON-RECURRING (+	/-)					
	٥.	ITEM	-	SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTE)
				COST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4	.)
						(TABLE A-2)	
		a. BASELINE EQUIP.	REPLCMNT.				\$C	•
		b.					\$0)
		c.					\$0)
ı		d.					\$0)
		e.					\$0)
		f. TOTAL		\$0			\$0)
	C.	TOTAL NON-ENERG	Y DISCOUNTE	SAVINGS (+	-) OR COST (-)	(3A4 + 3Bf4) =		\$0
	Eir	RST YEAR DOLLAR SA	VINGS (±) / C	OSTS (-)	(2	F3+3A4+(3Bf1/	Economic Life))	\$914
		MPLE PAYBACK (SPB)			-	(1G/4) =		61.01
11		OTAL NET DISCOUNTE		_ - , • ,		(2F5 + 3C) =		\$15,486
11		SCOUNTED SAVINGS		NT RATIO (SIF	₹)	(6/1G) =		0.28
$\ '$. וט	SCOUNTED SAVINGS- (MUST HAVE SIR >						
11		MAIOST LIMAT OUT >						

ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	+	2	
PROJECT	_	Limited Energy Study, Insulating Brick Buildings, Fort Leonard Wood, MO	Leonard W	ood. MO			DATE PREDABEN	- PAPEN	- 1	- 90 40
ENGINEER	:R	neers, Inc.					ESTIMATOR	LL ANED	-8-1	18-rep-90
		Denver, CO					CHECKED BY	J BY	<u>م</u> ا	D. Sinz A Niemeyer
. <u>.</u>	14000			MA	MATERIAL COS	ST		ABOR COST		262
S G	Code	Item Description	Unit of	C. C.	Unit	1	Crew/	Hours/		
_		BUILDING 630	Measure	Guantity	Cost	lotal	Worker	Chrit	Total	TOTAL
2		INSTALL 1.5" RIGID INSULATION ON WALLS								
ო .			The state of the s							
4	11-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	6971.0	\$0.59	\$4,123.21	1-CARP	0.008	\$1 465	\$5 588
2	ا ا	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	6433.0	\$0.20	\$1,288.79	2-CARP	0.017	\$5.746	\$7,035
٥	F.S.		ц.	2674.0	\$0.19	\$510.20	1-CARP	0.016	\$1.124	\$1634
_ α	D12/AMAL	BELOCATE 120 BASES OF PAINT ON DRYWALL	S.F.	6971.0	\$0.07	\$465.52	1-PORD	0.01	\$1,683	\$2,148
0	D24/AMAL	DELOCATE 12 BASEBOARD RADIATION	EA.	2.0	\$18.39	\$36.79	9-0	5.25	\$918	\$955
, c	BENMAH	DELOCATE 24 BASEBOARD KADIATION	Ë	4.0	\$18.39	\$73.57	9-O	5.68	\$1,987	\$2,061
7	RE IR	DELOCATE O BASEBOARD RADIATION	Ë,	2.0	\$18.39	\$36.79	9-0	4.68	\$819	\$855
12	REI	RELOCATE ELECTRICAL JUNCTION BOX	i E	2.0	\$7.82	\$15.65	1-ELEC	1.3	\$79	\$95
1 (RFO	REI OCATE EI ECTBICAL OLITI IT	i Œ	0.	\$0.00	\$0.00	1-ELEC	3.25	\$39	66\$
4	RFF	RELOCATE ELECTRICAL UNILEI	ઇ દે	2.0	\$7.97	\$15.93	1-ELEC	0.896	\$55	\$70
15	RKS	RELOCATE LABOR VITOLEN CINIC	. F	0.	\$0.00	\$0.00	1-CARP	0.2	\$5	\$5
16	RSD	RELOCATE SOAD DISDENSED	1 €	2.0	\$71.07	\$142.15	Ġ	16.751	\$1,887	\$2,030
17	RT	RELOCATE THEDMOSTAT	₹	1.0	\$0.00	\$0.00	1-CARP	0.7	\$18	\$18
18	RTS	RELOCATE TOIL ET STALL	Ę,	1.0	\$0.00	\$0.00	1-ELEC	1.7	\$52	\$52
19	RWP	REI OCATE 1/2" HW & CW/ DOMESTIC BIBING	Į į	2.0	\$0.00	\$0.00	2-CARP	3.536	\$372	\$372
20	RWPI		<u>.</u>	0.0	\$25.05	\$25.05	Ġ	4.546	\$256	\$281
21	RWTC	RELOCATE WATER CLOSET	1	2.0	\$0.00	\$0.00	1-CARP	0.654	\$34	\$34
	RAT	.00	Ä.	2.0	\$35.83	\$71.66	0-2	10.904	\$1,911	\$1,983
23	IWB-1/2	INSTALL 1/2" WATEBODE BOD TABLE	ن ز	274.0	\$1.14	\$313.68	1-CARP	0.134	\$965	\$1,278
24	WB-5/8	INSTALL 5/8" WATERPRE BRD TABED & SANDE	Т. Г	136.0	\$0.84	\$114.24	2-CARP	0.02	\$143	\$257
25	70	INSTALL CERAMIC TILE 4.1/1" × 4.1/1" TILE	 	402.0	\$0.96	\$383.91	2-CARP	0.02	\$422	\$806
26		100 100 100 100 100 100 100 100 100 100	T.	538.0	\$1.83	\$985.44	2-TILE	0.084	\$2,189	\$3,174
27		SUBTOTAL	:	!		000				
28	DIFF	DIEFICIII TI V EACTOD				\$8,603			\$22,230	\$30,833
29					2%				\$1,112	\$1,112
30	PRO	PROFIT		1		\$8,603			\$23,342	\$31,944
31		SIBTOTAL		:	10%	\$860			\$2,334	\$3,194
32	НО	OVERHEAD		:		\$9,463			\$25,676	\$35,139
33		SUBTOTAL			17%	\$1,609			\$4,365	\$5,974
34	CONT	CONTINGENCY		-		\$11,072			\$30,041	\$41,112
:	_0 0	18			20%	\$2,214		: :	\$6,008	\$8,222
						\$13,286			\$36,049	\$49,334

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS CLIENT CONTRACT NO.: DACA 01-94D-0033	
CLIENT CONTRACT NO.: DACA 01-94D-0033	DATE: Feb-9
	BY: DN
II	JOB: 1406.01
LOCATION: FT LEONARD WOOD, MO.	CHK: A.
	FILE: 630Z1BI
BUILDING HEATING LOAD CALCULATION SHEET	
BLDG NO: 630 BLDG NAME: MESS HALL - ZONE 1 BLDG FUNCTION: KITCHEN AREA	· · · · · · · · · · · · · · · · · · ·
FLOOR AREA: (SQ. FT) 3,801 # FLOORS	1
SLAB PERIMETER: (FT) 159	
I. AREAS: ([] FIELD VERIFIED ELEVATION PLANS)	
NORTH SOUTH EAST WEST TOTAL	AL
	2,862
GLASS (SQ. FT) 0 127 35 28	190
PERSONNEL DOOR (SQ. FT) 0 42 21 42 OVERHEAD DOOR (SQ. FT) 0 0 0 0	105
	2,567
	3,801
OVERHEAD DOOR (SQ. FT) 0 PERSONNEL DOOR (SQ. FT)	105
BASEMENT WALLS (SQ. FT) 0 0 0 0	0
II. CONSTRUCTION: ([] FIELD VERIFIED WALL, ROOF, WINDOW, DOOR TYPES)	1 5
WALLS: (SKETCH CROSS SECTION OF WALL) COMPONENTS 1. I OUTSIDE AIR FILM	R-VALUE 0.1
2. 4" FACE BRICK	0.1
3. AIR SPACE	0.9
4. 6" CMU	1.8
5.	
6. 7. INSIDE AIR FILM	0.6
TOTAL R-WALL =	4.0
U = 1/R	0.24
POOE, JEVETCH CROSS SECTION OF POOE)	5 VALUE
ROOF: (SKETCH CROSS SECTION OF ROOF) COMPONENTS 1. OUTSIDE AIR FILM	R-VALUE 0.1
2. BUILT UP ROOF	0.3
3. 1.5" INSULATION	6.0
4. CEILING AIR SPACE	1.0
5. 6" FG BATT INSUL 6. PLASTER CEILING	19.0
7. INSIDE AIR FILM	0.6
TOTAL R-ROOF =	28.4
U = 1/R	0.03
	SS 1.6
IGLASS TYPE: PPG 'PENNVERNON' C.I. TWNDV. SSA. 88 S.C. R-GLAS	
GLASS TYPE: PPG 'PENNVERNON' C.L. TWNDV, SSA, .88 S.C. R-GLAS SLAB TYPE FLOOR: CEMENT SLF	
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE	
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO	OR 0.0
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO PERSONNEL DOOR TYPE: METAL R-PDO	OR 0.0
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO PERSONNEL DOOR TYPE: METAL R-PDOO III. INFILTRATION:	OR 0.00 OR 2.50
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO PERSONNEL DOOR TYPE: METAL R-PDO III. INFILTRATION: TIGHT WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 =	OR 0.00 OR 2.5
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO PERSONNEL DOOR TYPE: METAL R-PDO III. INFILTRATION: TIGHT WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 =	OR 0.00 OR 2.50
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO PERSONNEL DOOR TYPE: METAL R-PDO III. INFILTRATION: TIGHT WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 = AVG. WALL H/M/L (SQ.FT.) M 2862 X CFM / SQ.FT. 0.115 = LEAKY WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 = DOOR OPENINGS / HR - SINGLE DOOR X CFM / OPENING / H 1.600 =	OR 0.00 OR 2.50
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO PERSONNEL DOOR TYPE: METAL R-PDO III. INFILTRATION: TIGHT WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 = AVG. WALL H/M/L (SQ.FT.) M 2862 X CFM / SQ.FT. 0.115 = LEAKY WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 = DOOR OPENINGS / HR - SINGLE DOOR X CFM / OPENING / H 1.600 = DOOR OPENINGS / HR - DOUBLE DOORS 20 X CFM / OPENING / H 1.385 =	OR 0.00 OR 2.50
SLAB TYPE FLOOR: CEMENT SLF BASEMENT TYPE: NONE R-BASE OVERHEAD DOOR TYPE: NONE R-ODO PERSONNEL DOOR TYPE: METAL R-PDO III. INFILTRATION: TIGHT WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 = AVG. WALL H/M/L (SQ.FT.) M 2862 X CFM / SQ.FT. 0.115 = LEAKY WALL H/M/L (SQ.FT.) X CFM / SQ.FT. 0.000 = DOOR OPENINGS / HR - SINGLE DOOR X CFM / OPENING / H 1.600 =	OR 0.00 OR 2.50
SLAB TYPE FLOOR: CEMENT SLE	OR 0.00 OR 2.5
SLAB TYPE FLOOR: CEMENT SLET	OR 0.00 OR 2.5
SLAB TYPE FLOOR: CEMENT SLET	OR 0.00 OR 2.5
SLAB TYPE FLOOR: CEMENT SLET	OR 0.00 OR 2.5
SLAB TYPE FLOOR: CEMENT SLE	OR 0.00 OR 2.5
SLAB TYPE FLOOR: CEMENT SLET	OR 0.00 OR 2.5

TOTAL UA (BTU/HR°F)

1,423

E M C ENGINEERS	INC.			-		DATE:	Feb-96
PROJECT: LIMITED ENERGY	STUDY, INSULATE	BRICK BUIL	DINGS			BY:	
CLIENT CONTRACT NO.: DAG	CA 01-94D-0033					JOB:	
LOCATION: FT LEONARD W	-						
TO STATE OF THE ST	30D, IIIQ.					CHK:	ILA
						FILE:	630Z2BHI
BUIL	DING HEATING	LOAD C	ALCULA	TION SHEE	ĒΤ		
BLDG NO: 630	BLDG NAME:	MESS HA	LL - ZONE :	2			
BLDG FUNCTION:	DINING AREA	THE SO TIA	LL - ZONL A	<u> </u>			
FLOOR AREA: (SQ. FT)	7,190	_	-			# FLOORS	1
SLAB PERIMETER: (FT)	257	_					
I. AREAS: ([] FIELD VERIFIE	D ELEVATION PLAN	(S)					
		NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS	(SQ. FT)	1,530	0	1,678	1,678	4,886	
GLASS PERSONNEL DOOR	(SQ. FT)	84	0	128	144	356	
INSULATED PANEL	(SQ. FT) (SQ. FT)	0	0	63	63	126	
WALLS, NET	(SQ. FT)	1,446	0	400 1,087	1,071	3,604	
ROOF AREA (OR CEILING ARE	A IF ATTIC IS UNCO	ONDITIONEL	D)	.,007	(SQ. FT)	7,190	
INSULATED PANEL	(SQ. FT)	800	PERSONNE	L DOOR	(SQ. FT)	126	
BASEMENT WALLS	(SQ. FT)	0	0	0	0	0	
II. CONSTRUCTION: ([] FIEL	D VERIFIED WALL,	ROOF, WIN	DOW, DOO	R TYPES)			
WALLS: (SKETCH CROSS SEC	CTION OF WALL)				OMPONEN		R-VALUE
					OUTSIDE		0.17
					4" FACE AIR SPAC		0.43
					6" CMU	· C	0.91 1.89
				5.			1.00
				6.			
				7.	INSIDE A		0.68
				ì	TOTAL	R-WALL = U = 1/R	4.08 0.245
						<u> </u>	0.245
ROOF: (SKETCH CROSS SECT	ION OF ROOF)				MPONEN		R-VALUE
				1.	OUTSIDE	AIR FILM	0.17
				2.	BUILT UP 1.5" INSU	LATION	0.34 6.00
						IR SPACE	1.00
				5.[6" FG BA	TT INSUL	19.00
				6.	PLASTER	CEILING	1.25
				' ·}	INSIDE AI	R-FILM R-ROOF =	0.68
				ŀ		U= 1/R	28.44 0.035
CLACC TYPE			***				0.000
GLASS TYPE: GLAB TYPE FLOOR:	PPG 'PENNVERN' CEMENT	DN' C.L. TV	VNDV, SSA	, .88 S.C.		R-GLASS	1.61
ASEMENT TYPE:	NONE					SLF	0.83
NSULATED PANEL:						R-BASEM.	0.00 4.20
ERSONNEL DOOR TYPE:	METAL					R-PDOOR	2.56
I. INFILTRATION:							
IGHT WALL H/M/L (SQ.FT.)			X CFM / S	Q.FT.	0.000	=	0
NG. WALL H/M/L (SQ.FT.) EAKY WALL H/M/L (SQ.FT.)	M	4886	X CFM / S		0.115	=	562
OOR OPENINGS / HR - SINGLE	DOOR		X CFM / S	Q.FT. PENING /HR	0.000	=	0
OOR OPENINGS / HR - DOUBL	E DOORS	100		PENING /HR	1.600 1.385	=	120
		ıΤ		TRATION (CF		=	700
UA PANEL	PANEL AREA	800		PANEL "U"			
UA PDOOR	PDOOR AREA	126		DOOR "U"	0.238	=	190
UA WALL	WALL AREA	2,804		WALL "U"	0.245	=	883
UA ROOF	ROOF AREA	7,190		ROOF "U"	0.035	=	253
UA GLASS UA SLAB	GLASS AREA SLAB PERIM.	356 257	X	GLASS "U"	0.621	=	221
UA BASEM.	B-WALL AREA	0		X SLF BASE, "U"	0.830	=	213
INFILTRATION	CFM	700		X A. T. F.	1.035	= =	725
				TAL UA (BTU	/MK"F)		2.535

2,535

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

PREPARED BY: CHECKED BY:

DMS AJN

630 ZONE:

FILE: BLDG: 630Z1.XLS

	Rates	of F	leat Gain from Occupants of Con-	ditioned Spaces				
Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	20	5	Standing, light work, or walking slowly	Retail store, bank	270	220	5,400	4,400
TOTAL	20					TOTAL	5,400	4,400

	Peak Wattage Value for Lights														
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage										
1	23	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	3,864										
	16	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	1,344										
			0	0	0										
TOTAL	20														
TOTAL	39			TOTAL	5,208										

			Peak Value for Internal Gains					
Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)	
1	3	89	Refrigerator (large), per 100 cu.ft. of space	220	40%	660	2,253	
	6	99	Range (burners), per 2 burner section	2,101	0%	12,606	43,024	
	4	95	Fryer (deep fat), per lb. of fat capacity	372	0%	1,488	5,079	
L	2	83	Freezer (large)	1,340	40%	2,680	9,147	
	1	115	Steam Kettle, per quart capacity	146	13%	146	498	
	5	88	Mixer (large), per quart of capacity	28	100%	140	478	
	2	97	Oven (large convection), per cu.ft. of oven space	1,304	0%	1,304	1,535	
	1	73	Blender,per quart of capacity	454	98%	454	1,550	
	2	114	Dishwasher (conveyor water sanitizing), per 100 dish/hr.	346	44%	692	2,362	
-	2	87	Microwave oven (Heavy duty commercial)	2,628	100%	2,628	1,535	
F								
-								
-			1.00	TOTAL	21%	22,798	67,460	

D4-11

EMC Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.: DATE: 1406-011

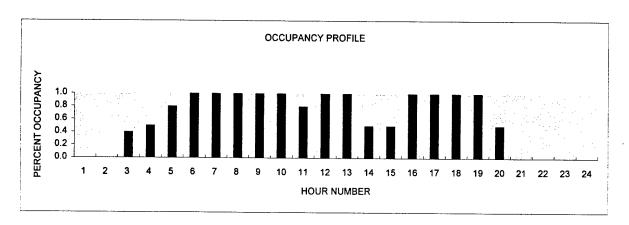
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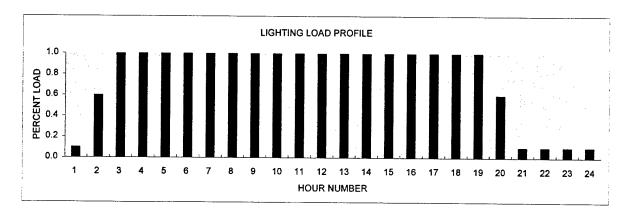
DATE: 26-Jan-96 PREPARED BY: DMS

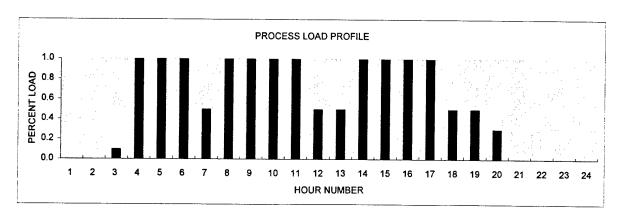
CHECKED BY: AJN
FILE: 630Z1.XLS

BLDG: ZONE:

BLDG	BLDG	TYPE OF											HOU	R NUI	MBER											
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0.0	0.0	0.4	0.5	0.8	1.0	1.0	1.0	1.0	1.0	0.8	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.1	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.5	0.5	1.0	1.0	1.0	1.0	0.5	0.5	0.3	0.0	0.0	0.0	0.0







E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

FILE:

BLDG:

26-Jan-96 DMŞ

PREPARED BY: CHECKED BY:

AJN

630

ZONE:

2

	Rates of Heat Gain from Occupants of Conditioned Spaces														
Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)							
180.	240		Seated Eating	Restaurant	225	325	54,000	78,000							
	10		Standing, light work, or walking slowly	Retail store, bank	270	220	2,700	2,200							
TOTAL	250					TOTAL	56,700	80,200							

			Peak Wattage Value for Lights		
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage
2	32	18	Incandescent - 60w	60	1,920
	68	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	5,712
TOTAL	100			TOTAL	7,632

			Peak Value for Internal Gains				
Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
2	2		Refrigerator (large), per 100 cu.ft. of space	220	40%	440	1,502
	2		Range (burners), per 2 burner section	2,101	0%	4,202	14,341
	2		Fryer (deep fat), per lb. of fat capacity	372	0%	744	2,539
	- 2		Freezer (large)	1,340	40%	2,680	9,147
	4		Steam Kettle, per quart capacity	146	13%	584	1,993
	7 2		Mixer (large), per quart of capacity	28	100%	56	191
	4		Oven (large convection), per cu.ft. of oven space	1,304	0%	1,304	4,451
	1	71	Water Heater	2,475	30%	2,475	8,447
	2		Carving Knife	92	5%	184	628
			Dishwasher	1,201	100%	1,201	4,099
	2		Coffee brewing Urn (large), per quart capacity	624	105%	1,248	4,259
	2		Ice maker	1,089	251%	2,178	7,434
	2		Griddle/grill (large), per sq.ft. of cooking surface	4,981	10%	4,981	17,000
	4		Toaster	1,146	100%	1,146	3,911
	-	 					
				TOTAL	50%	23,423	79,943

EMC Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

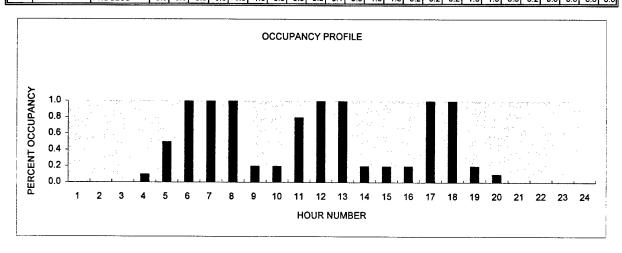
PREPARED BY: DMS CHECKED BY: AJN

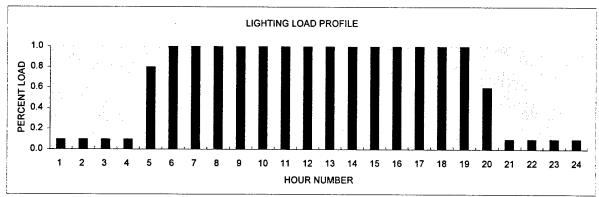
FILE: BLDG: ZONE:

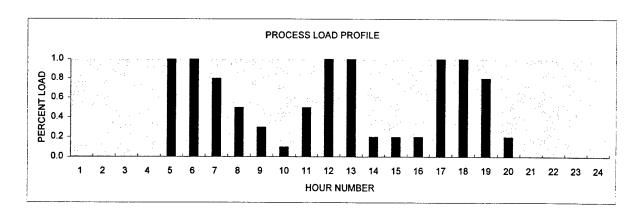
630

2

BLDG	BLDG	TYPE OF		HOUR NUMBER																						
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0.0	0.0	0.0	0.1	0.5	1.0	1.0	1.0	0.2	0.2	0.8	1.0	1.0	0.2	0.2	0.2	1.0	1.0	0.2	0.1	0.0	0.0	0.0	0.0
1		LIGHTING	0.1	0.1	0.1	0.1	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.0	0.0	1.0	1.0	0.8	0.5	0.3	0.1	0.5	1.0	1.0	0.2	0.2	0.2	1.0	1.0	0.8	0.2	0.0	0.0	0.0	0.0







BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE ----- PROGRAM CONTROL OPTIONS ------COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1 SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA -----*****REAL WEATHER FROM DISK***** FILE NAME MO STATION 13995 YEAR 1955 SITE LATITUDE DEG (AL1) 37.750000 1158.000000 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 40515.000000 FLOOR AREA (SQFT) 3801.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1128650.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 76020.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 357.000000 INFILTRATION PROFILE
 1.00
 1.00
 1.00
 1.00

 1.00
 1.00
 1.00
 1.00

 1.00
 1.00
 1.00
 1.00
 1.00 1.00 1.00 1.00 1.00 1.00 1.00 A FACTOR IN INFILTRATION EQUATION (CINA) 5.290000E-01 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 24800.000000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 159.000000 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 41.000000
WINDOW GLASS NUMBER (NG) 30 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01 WINDOW SHADING FACTOR (SHD) 5.900000E-01

	WALL DAT			
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1361.0	596.0	.0	610.0
WINDOW AREA SQFT (AWND)	127.0	28.0	.0	35.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	12.7	2.8	.0	3.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	.245
WALL IKANSPER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
CN FACTORS NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				J
N=1	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	******	*****	*****	*****
BN FACTORS BN (BN) N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND)	5	5	5	5
N=1	1.00000	1.00000	1.00000	1 00000
N=2	-1.50943	-1.50943	-1.50943	-1 50943
N=3	.65654	.65654	-65654	65654
N=4	07415	07415	07415	- 07415
N=5	.00212	.00212	00212	00212
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 3801	*****	*****	******	******
ROOF AREA SQFT (AROF) 3801	.000000			
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(TROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.6967	39E-02	_	
ROOF B TRANSFER FUNCTIONS (BNR))			
.951E-03 .982E-02 .593E-02	.266E-03	380.	380	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00600 .822E-01 -	300E-03	999.	999.	
SKYLIGHT TILT DEGREES (TILT)	0.0000001	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.0000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKC	0.00 (W	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.00000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S	HSK) 0.	.000000E+00)	
SUMMER START MONTH AND DAY FOR	SHSK (MST	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	SK (MND NE	(רועוכ	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.00000E+0	00		
SKY LIGHT AREA SQFT (ASKY) 0 DAYTIME SKY LIGHT U BTU/SQFT-HR	-F (SKYU)	1.2	92998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKYU	IN)	1.292998	
FRACTION OF PROCESS HEAT TO INT				
	ERNAL SPAC	E (FAP)	2.100000E	-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW		- BTU/HR -			20 1
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	5.	14167.	5400.	4400.		
HOUR	H	OURLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	60.0	.0
2	.600	.000	.000	.000	60.0	. 0
3	1.000	.100	.400	.400	60.0	. 0
4	1.000	1.000	.500	.500	60.0	.0
5	1.000	1.000	.800	.800	60.0	.0
6	1.000	1.000	1.000	1.000	60.0	.0
7	1.000	.500	1.000	1.000	60.0	.0
8	1.000	1.000	1.000	1.000	60.0	.0

```
1.000 1.000 1.000 1.000
1.000 1.000 1.000 1.000
1.000 1.000 .800 .800
                                              60.0
                                                           .0
  9
                                              60.0
 10
                                                           .0
                                              60.0
 11
                                                           .0
                 .500
                         1.000
1.000
.500
                                  1.000
                                              60.0
 12
          1.000
                                                           .0
                   .500
          1.000
                                               60.0
                                                           .0
 13
                                   .500
                                              60.0
         1.000
 14
                   1.000
                                                           .0
         1.000 1.000
1.000 1.000
                           .500
                                              60.0
 15
                                     .500
                                                           . 0
                                  1.000
                                              60.0
                                                           .0
                          1.000
 16
                                  1.000
                                              60.0
         1.000 1.000 1.000
                                                           .0
 17
                  .500 1.000 1.000
                                              60.0
                                                           .0
 18
         1.000
         1.000
                   .500 1.000 1.000
                                              60.0
                                                           .0
 19
                          .500
                                   .500
 20
          .600
                   .300
                                              60.0
                                                           . 0
 21
           .100
                   .000
                            .000
                                     .000
                                              60.0
                                                           .0
           .100
                   .000
                            .000
                                     .000
                                                           .0
 22
                   .000 .000
.000 .000
                   .000
                                     .000
 23
           .100
                                    .000
           .100
                                              60.0
                                                           .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                       100.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 16500.000000
ECONOMIZER HIGH TEMP LIMIT F 100.000000
SYSTEM SUPPLY AIR START TIME HR
                              1.000000
SYSTEM SUPPLY AIR STOP TIME HR
                               24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
                             65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)
                                          1.000000
FAN EFFICIENCY (EFAN)
                   5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP)
                                    1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1128650.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 1410813.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                            .451
              .200 .286 .300 .369
                                                     .400
.100
       .191
                                                     .800
                                    .700
 .500
         .537
                  .600
                           .625
                                            .718
                                                              .812
         .906
                  1.00
                           1.00
 .900
CHILLER TYPE (ITYPCH)
                           4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN) 0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                         .000
                                                     .000
.000 .000 .000 .000
                                                              .000
                  .000
                          .000
                                            .000
                                    .000
                                                     .000
                                                              .000
 .000
         .000
                 .000
 .000
         .000
                          .000
```

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	N				
			SOLAR		DOOR				VENT	
			THRU		AND				AND	
MNT	H LOAD			ROOF	SLAB	BSMT	WALL	WINDOW	INFL	
JAN			3.	0.	0.	0.	0.	0.	0.	0.
	-247.	LOSS		-3.	-4.	0.	-8.	-2.	-261.	0.
FEB	0.		4.		0.		1.			0.
	-203.	LOSS		-2.	-3.	0.	-6.	-2.	-219.	0.
MAR	0.		5.	0.	0. -3.	0.	1. -5.	0.	0.	0.
	-179.	LOSS		-2.	-3.	0.	-5.	-1.	-201.	0.
APR	.00	GAIN	4.44	.22	.01	.00	2.95	.01	1.17 -88.75	.00
	-61.07	LOSS		-1.24	-1.64	.00	-2.01	82	-88.75	.00
			4.72				4.06			.00
	-15.17	LOSS		82	-1.04	.00	82	50	-48.10	.00
JUN	.00		4.79				4.22	.01	1.39	.00
	10	LOSS		73	95	.00	69	46	-31.82	.00
JUL		GAIN	4.88		.02		4.24			.00
	01	LOSS		78	99	.00	82	49	-33.91	.00
AUG	.00	GAIN	4.28		.02		4.06	.01	1.50	.00
	.00	LOSS		74	88	.00	63	43	-33.31	.00
			4.01		.03		3.20			.00
	-12.84	LOSS		96	-1.11	.00	-1.04	55	-42.66	.00
OCT			3.67				2.16			.00
	-56.70	LOSS		-1.30	-1.46	.00	-2.03	71	-84.18	.00
NOV	0.		3.		0.	0.		Ο.	0.	0.
	-128.	LOSS		-2.	-2.	0.	-4.	-1.	-149.	0.
DEC	0.		3.			0.	0. -8.	0.	0.	0.
	-275.	LOSS		-3.	-4.	0.	-8.	-2.	-287.	0.
	0.						28.		11.	0.
	-1178.	LOSS		-19.	-24.	0.	-39.	-12.	-1479.	0.
MAX	HEATING	LOAD=	-1128	650. B	TUH ON D	DEC 18	HOUR 9	AMR	IENT TEMI	· 3.
MAX	COOLING	LOAD=		0. B	TUH ON D	DEC 31	HOUR 24	AMB	ENT TEM	

ZONE UA BTU/HR-F 920.8

BEACON Energy Analysis By EMC Engineers, Inc. 630A.I

FAN TOTAL

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

INTERN	AL									
	INTE	RNAL	SPACE			COIN-	LIGHTING	PROCESS		HEAT GAIN
	TEM	PERAT	URE F			CIDENT	THOUSAND	MILLION	MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR .	AMBT.	KWH	BTU	BTU	BTU

JAN	60	67		4	14	64.	3.02	29.07	8.55	27.47
OAN	00.	0,.	59.	_		9.				
			37.	2,5	-					
555	6 3	72		17	17	50.	2.73	26.26	7.14	24.23
FEB	6 Ι.	73.				16.	2.73	20.20	,	
			5 9.	2	1	16.				
							2 00	20.07	7.21	26.13
MAR	63.	82.		11		61.	3.02	29.07	7.21	20.13
			59.	14	1	23.				
										04.70
APR	67.	90.		7		65.	2.92	28.13	6.41	24.72
			60.	11	1	34.				
MAY	72.	99.		27	19	76.	3.02	29.07	6.67	25.59
			60.	11	1	39.				
JUN	79.	101.		30	19	82.	2.92	28.13	6.06	24.37
			60.	19	2	57.				
JUL	84.	111.		15	19	87.	3.02	29.07	6.35	25.27
002			60.	10	5	57.				
AUG	82	106.		12	19	84.	3.02	29.07	6.63	25.55
ססת	02.	100.	61.			59.				
			Ψ.							
SEP	76	106.		2	19	83.	2.92	28.13	5.83	24.14
SEP	76.	100.	60.				2.7			
			60.	20	_	40.				
0 CIT	6.7	0.0		1	1 5	85.	3.02	29 07	6.85	25.77
OCT	6/.	88.		_		36.	3.02	25.07	0.05	
			60.	7.1	_	30.				
						E0	2.92	28.13	7.00	25.30
NOV	63.	80.		17		59.	2.92	20.13	7.00	23.30
			59.	2	24	20.				
				_		 -	2 22	20 27	7 07	25.99
DEC	61.	75.					3.02	29.07	7.07	20.33
			52.	18	7	-1.				
										224 52
YEAR							35.55	342.26	81.75	304.52

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF HO	OURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WERE	NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING COO	DLING	HEATING	COOLING
JAN	674	0	0	0	10765.05	
FEB	564	-	-	-	1076E+07	.0000
		0	0	0	9507E+06	.0000
MAR	542	0	0	0	8501E+06	.0000
APR	282	0	0	0	5785E+06	.0000
MAY	123	0	0	0	3999E+06	.0000
JUN	6	0	0	0	-,4719E+05	.0000
\mathtt{JUL}	2	0	0	0	-8482.	.0000
AUG	0	0	0	0	.0000	.0000
SEP	112	0	0	0	2707E+06	.0000
OCT	331	0	0	0	4979E+06	.0000
NOV	436	0	0	0	8093E+06	.0000
DEC	584	0	12	0	1129E+07	.0000
YEAR	3656	0	12	0	1129E+07	.0000

SYSTEM TOTALS

MONTE	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	TION PROCESS MILLION BTU	THE FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	381.93	.00	3.02	29.07	2.50	27.47	8.7
FEB	315.42	.00	2.73	26.26	2.09	24.23	8.7
MAR	282.17	.00	3.02	29.07	2.11	26.13	8.7
APR	113.45	.00	2.92	28.13	1.88	24.72	8.7
MAY	39.57	.00	3.02	29.07	1.95	25.59	8.7
JUN	1.61	.00	2.92	28.13	1.77	24.37	8.7
JUL	.54	.00	3.02	29.07	1.86	25.27	8.7
AUG	.00	.00	3.02	29.07	, 1.94	25.55	8.7
SEP	33.45	.00	2.92	28.13	1.71	24.14	8.7
OCT	118.29	.00	3.02	29.07	2.01	25.77	8.7
NOV	211.22	.00	2.92	28.13	2.05	25.30	8.7
DEC	390.66	.00	3.02	29.07	2.07	25.99	8.7
YEAR	1888.31	.00	35.55	342.26	23.95	304.52	8.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 640264. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL KITCHEN AREA - ZONE 1 BASELINE

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR	ACTUAL SOLAR								
	INSOL. HORIZ. SURF. BTU/ SQFT- DAY	INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG.	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	1076E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	9507E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	8501E+06
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.0000	5785E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.0000	3999E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	4719E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	-8482.
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	2707E+06
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.0000	4979E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	8093E+06
DEC	883.	604.	1.000	35.	0.	0.	0	12	.0000	1129E+07

```
BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.
 ----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
                                                 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
                                                   70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 40515.000000
FLOOR AREA (SQFT) 3801.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1128650.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 76020.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 357.000000
INFILTRATION PROFILE
                                          1.00
 1.00 1.00 1.00
                                1.00
                                                                  1.00
                                                       1.00

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00

                                                                  1.00
 1.00
                                                                              1.00
                                                                  1.00
 1.00
                                                                             1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 5.290000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 24800.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 159.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 41.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                    WALL DATA
                                    1 2
WALL NUMBER
                                                          3
                                    .00
                                               90.00 180.00
AZIMUTH ANGLE (AZ)
                                                                     -90.00
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
                                 1361.0 596.0 .0 610.0
WINDOW AREA SQFT (AWND) 127.0 28.0 .0 35.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 12.7 2.8 .0 3.5 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00176	.00176	.00176	
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000 .00016	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=1 N=2 N=3 N=4 N=5 N=6	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728	.00728
N=6	00002	00002	00002	00002
DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 3801 ROOF U VALUE BTU/HR-SQFT-F (URI	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.6967	39E-02		
ROOF B TRANSFER FUNCTIONS (BNR))			
.951E-03 .982E-02 .593E-02		380.	380.	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00600 .822E-01	300E-03	999.	999.	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.6	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO				
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (S	1			
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SH			1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-HE	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	2.1000001	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					POINT D	EG F
	KW		- BTU/HR - PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	5.	14167.	5400.	4400.		
HOUR	H	OURLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	60.0	.0
2	.600	.000	.000	.000	60.0	. 0
3	1.000	.100	.400	.400	60.0	. 0
4	1.000	1.000	.500	.500	60.0	.0
5	1.000	1.000	.800	.800	60.0	. 0
6	1.000	1.000	1.000	1.000	60.0	.0
7	1.000	.500	1.000	1.000	60.0	.0
8	1.000	1.000	1.000	1.000	60.0	. 0

```
    1.000
    1.000
    1.000
    1.000

    1.000
    1.000
    1.000
    1.000

    1.000
    1.000
    .800
    .800

    1.000
    .500
    1.000
    1.000

                                                             .0
                                                  60.0
  9
                                                  60.0
 10
                                                  60.0
 11
                          1.000 1.000
1.000 1.000
.500 .500
.500 .500
                   .500
                                                  60.0
                                                               . 0
 12
                                                  60.0
                                                               .0
          1.000
                    .500
 13
                          .500 .500
.500 .500
1.000 1.000
1.000 1.000
                                                  60.0
                                                               .0
                    1.000
          1.000
 14
                                                  60.0
                                                               .0
         1.000 1.000
 15
                                                  60.0
         1.000 1.000
                                                               .0
 16
                                                  60.0
         1.000 1.000
                                                               .0
 17
                   .500
                                                  60.0
                                                               .0
         1.000
 18
                    .500 1.000 1.000
                                                  60.0
                                                               .0
         1.000
 19
                                      .500
                                                  60.0
                    .300 .500
                                                               .0
 20
          .600
                                                  60.0
                                                               . 0
                              .000
                                       .000
           .100
                    .000
 21
                                       .000
                              .000
                                                  60.0
                                                               . 0
           .100
                     .000
 22
                    .000 .000 .000
.000 .000
                                       .000
                                                   60.0
                                                               .0
           .100
                    .000
 23
                                                  60.0
                                                               .0
           .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 60.000000
                                           100.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 16500.000000
ECONOMIZER HIGH TEMP LIMIT F 100.000000
SYSTEM SUPPLY AIR START TIME HR
                                   1.000000
SYSTEM SUPPLY AIR STOP TIME HR
                                 24.000000
                               65.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)
                                            1.000000
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP)
                                      1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1128650.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 1410813.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
        .191 .200 .286 .300 .369
                                                       .400 .451
 .100
                                                                  .812
                                      .700
                                               .718
                                                        .800
 .500
          .537
                   .600
                             .625
                   1.00
                             1.00
 .900
          .906
CHILLER TYPE (ITYPCH)
                             4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN) 0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 000. 000. 000. 000. 000. 000.
                                                                 .000
               .000
                            .000
                                      .000
                                               .000
                                                        .000
                                                                  .000
 .000
          .000
                   .000
                            .000
          .000
 .000
```

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	TN				
			SOLAR		D00	R			VENT	
			THRU		AND				AND	
	TH LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	V INFL	LATENT
JAI	٥.		3.	0.		0.		0.	0.	0.
	-241.	LOSS		-3.	-4.	0.	-2.		-262.	0.
FEE	- •		4.	0.	0.	0.	0.	0.	0.	0.
	-199.	LOSS		-2.	-3.				-219.	0.
MAH	0.		5.	0.	0.		0.	0.	0.	0.
	-177.	LOSS		-2.	-3.	0.			-201.	0.
	.00		4.44				.58	.01	1.13	.00
	-60.58	LOSS		-1.24	-1.64	.00	37	82	-87.42	.00
	.00		4.72						1.55	.00
	-15.39	LOSS		80	-1.00	.00	06	48	-45.98	.00
TT 75.7		~								
JUN	.00		4.79		.02	.00		.01	1.35	.00
	12	LOSS		70	91	.00	07	44	-29.35	.00
JUL	.00	CATA	4 00							
001	02	LOSS	4.88		.02		1.01		1.72	.00
	02	TOSS		76	95	.00	09	47	-31.47	.00
AUG	.00	GAIN	4.28	36	.02	0.0				
	.00		4.20		84					.00
		2000		/1	04	.00	05	41	-30.85	.00
SEP	.00	GAIN	4 01	.20	.03	0.0	7.1			
	-13.05		1.01		-1.09	.00	.71 09			.00
					1.09	.00	09	54	-41.20	.00
OCT	.00	GAIN	3.67	.09	.01	0.0	.35	.01	0.0	
	-56.20				-1.47		35		.98 -83.49	.00
					_, _,		.55	/2	-03.49	.00
NOV	0.	GAIN	3.	0.	0.	0.	0.	0.	0	0.
	-126.	LOSS		-2.	-2.	0.	-1.	-1.	-149	0.
										0.
DEC	٠.		3.	0.	0.	0.	0.	0.	0.	0.
	-270.	LOSS		-3.	-4.	0.	-2.	-2.		0.
	0.		48.	2.	0.	0.	6.	0.	11.	0.
	-1159.	LOSS		-19.	-24.	0.	-9.	-12	1467.	0.

MAX	HEATING	LOAD=	-11286	550. BI	UH ON I	DEC 18 H	OUR 9	AMBI	ENT TEMP	3.
MAX	COOLING	LOAD=		0. BI	UH ON I	DEC 31 H	OUR 24	AMBI	ENT TEMP	42.

ZONE UA BTU/HR-F 456.1

BEACON Energy Analysis By EMC Engineers, Inc. 630AFG.I

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

FAN TOTAL INTERNAL INTERNAL SPACE COIN-LIGHTING PROCESS HEAT HEAT GAIN THOUSAND MILLION MILLION MILLION TEMPERATURE F CIDENT MONTH AVG. MAX MIN DAY HR AMBT. KWH BTU BTU BTU JAN 60. 67. 4 14 64. 3.02 29.07 8.37 27.29 59. 26 24 12. FEB 61. 73. 17 50. 2.73 26.26 7.00 24.08 17 59. 1 16. 2 17 64. 3.02 29.07 7.13 26.05 MAR 63. 83. 11 60. 15 1 22. APR 67. 89. 29 19 69. 2.92 28.13 6.35 24.66 60. 11 1 34. 6.67 19 76. 3.02 29.07 25.59 MAY 72. 99. 27 60. 11 1 39. JUN 79. 101. 24 18 78. 2.92 28.13 6.06 24.37 60. 19 2 57. JUL 84. 110. 15 18 92. 3.02 29.07 6.35 25.27 60. 10 5 57. AUG 82. 106. 12 19 84. 3.02 29.07 6.63 25.55 61. 25 1 58. SEP 76. 106. 2 17 87. 2.92 28.13 5.83 24.14 60. 26 1 45. OCT 67. 88. 7 16 65. 3.02 29.07 6.79 25.71 60. 10 24 34. 63. 80. NOV 25 17 58. 2.92 28.13 6.86 25.17 60. 24 20. 61. 76. 18 55. 3.02 29.07 6.84 25.76 DEC 23

35.55

342.26

80.86 303.63

53.

YEAR

18 7 -1.

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF H	OURS WHE	MUMIXAM 1	LOADS
		INCLUDING	LOADS WERE	NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OLING	HEATING	COOLING
JAN	659	0	0	0	1058E+07	.0000
FEB	552	0	0	0	9316E+06	.0000
MAR	534	0	0	0	8345E+06	.0000
APR	278	0	0	0	5702E+06	.0000
MAY	125	0	0	0	3964E+06	.0000
JUN	5	0	0	0	4144E+05	.0000
JUL	2	0	0	0	1076E+05	.0000
AUG	0	0	0	0	.0000	.0000
SEP	114	0	0	0	2729E+06	.0000
OCT	322	0	0	0	4946E+06	.0000
NOV	424	0	0	0	8000E+06	.0000
DEC	565	0	12	0	1129E+07	.0000
YEAR	3580	0	12	0	1129E+07	.0000

BEACON Energy Analysis By EMC Engineers, Inc. 630AFG.I

SYSTEM TOTALS

	HEATING MILLION	COOLING THOUSAND	Y CONSUMPT LIGHTING THOUSAND	PROCESS MILLION BTU	TANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
MONTH	I BTU	KWH	KWH	ВІО	VMU	ВЮ	VM
JAN	372.91	.00	3.02	29.07	2.45	27.29	8.7
FEB	306.05	.00	2.73	26.26	2.05	24.08	8.7
MAR	278.04	.00	3.02	29.07	2.09	26.05	8.7
APR	111.90	.00	2.92	28.13	1.86	24.66	8.7
MAY	40.22	.00	3.02	29.07	1.95	25.59	8.7
JUN	1.34	.00	2.92	28.13	1.77	24.37	8.7
JUL	.54	.00	3.02	29.07	1.86	25.27	8.7
AUG	.00	.00	3.02	29.07	1.94	25.55	8.7
SEP	34.01	.00	2.92	28.13	1.71	24.14	8.7
OCT	116.49	.00	3.02	29.07	1.99	25.71	8.7
NOV	205.42	.00	2.92	28.13	2.01	25.17	8.7
DEC	381.88	.00	3.02	29.07	2.00	25.76	8.7
YEAR	1848.80	.00	35.55	342.26	23.69	303.63	8.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 629635. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/		AVG.	MAX SYS	TEM	SYSTE	S WHEN M LOADS	MAXIMUM COOLING LOAD	MAXIMUM HEATING LOAD
MONTH	SQFT- DAY	SQFT- DAY	PF FACTOR	DEG. F	DEG. +	F -	COOL	HEAT	BTU	BTU
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1058E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	9316E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	8345E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	5702E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.0000	3964E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	4144E+05
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.0000	1076E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.0000	2729E+06
OCT	1437.	953.	1.000	57.	0.	ο.	0	0	.0000	4946E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	8000E+06
DEC	883.	604.	1.000	35.	0.	0.	0	12	.0000	1129E+07

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BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
  FILE NAME MO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                               37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                              1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                56,000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                  70.000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
                                              9.00000E-03
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 40515.000000
 FLOOR AREA (SQFT) 3801.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1128650.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA)
                                                 76020.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 357.000000
INFILTRATION PROFILE
                 1.001.001.001.001.001.001.001.001.001.001.001.00
                                                              1.00 1.00
1.00 1.00
1.00 1.00
 1.00 1.00 1.00
 1.00
           1.00
        1.00
 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 5.290000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 24800.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 159.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 41.000000
WINDOW GLASS NUMBER (NG)
                            3.0
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                  WALL DATA
WALL NUMBER
                                   1 2 3
                                            90.00 180.00 -90.00
AZIMUTH ANGLE (AZ)
WALL AREA SQFT (AWLL)
AZIMUTH ANGLE (AZ)
                                  .00
WALL AREA SQFT (AWLL) 1361.0 596.0 .0 610.0 WINDOW AREA SQFT (AWND) 127.0 28.0 .0 35.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 12.7 2.8 .0 3.5 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.055	.055	.055	.055
CN FACTORS	.00174	.00174	.00174	.00174
CN FACTORS NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=1 N=2 N=3 N=4 N=5 N=6	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	******	******	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	00002
ROOF AREA SQFI (AROF) 3801	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)	1.6967	39E-02		
ROOF B TRANSFER FUNCTIONS (BNR)			
.951E-03 .982E-02 .593E-02		380.	380.	
ROOF D TRANSFER FUNCTIONS (DNR)			
1.00600 .822E-01	300E-03	999.	999.	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00			
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (1		_	
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SI	SHSK (MST	,NDST)	1	1
SKY LIGHT AREA SQFT (ASKY)	nsk (MMD,N)	(שמט	1	1
DAYTIME SKY LIGHT U BTU/SQFT-HI	D_E (CKVII)	J J	202000	
NIGHT TIME SKYLIGHT U BTU/SQFT-	-ND-E (GRAI V-E (DVIA)	T	474778	
FRACTION OF PROCESS HEAT TO IN	TERNAT. CDA	ωE (ΕΥD) Στι	2 100000	7_01
	LUIUM DEM	CD (PAF)	2.1000001	7-0T

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	5.	14167.	5400.	4400.		
HOUR	HO	OURLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	60.0	.0
2	.600	.000	.000	.000	60.0	.0
3	1.000	.100	.400	.400	60.0	.0
4	1.000	1.000	.500	.500	60.0	.0
5	1.000	1.000	.800	.800	60.0	.0
6	1.000	1.000	1.000	1.000	60.0	. 0
7	1.000	.500	1.000	1.000	60.0	. 0
8	1.000	1.000	1.000	1.000	60.0	.0

```
1.000 1.000 1.000 1.000
                                                          60.0
                                                                        .0
  9
            1.000 1.000
                                 1.000 1.000
                                                           60.0
                                                                          .0
  10
            1.000 1.000

    1.000
    .800
    .800

    .500
    1.000
    1.000

    .500
    1.000
    1.000

    1.000
    .500
    .500

    1.000
    .500
    .500

    1.000
    1.000
    1.000

    1.000
    1.000
    1.000

    .500
    1.000
    1.000

    .500
    1.000
    1.000

    300
    500
    500

                                   .800
                                             .800
                                                          60.0
                                                                          .0
  11
           1.000 .500
1.000 .500
1.000 1.000
1.000 1.000
                                                          60.0
                                                                           .0
  12
                                                           60.0
  13
                                                                           .0
                                                           60.0
  14
                                                                           .0
                                                           60.0
  15
                                                                           .0
                                                          60.0
  16
                                                                           .0
                                                          60.0
           1.000 1.000
  17
                                                                          . 0
                      .500
                                                          60.0
           1.000
                                                                          . 0
  18
                                                          60.0
  19
           1.000
                                                                          .0
                        .300
                                                          60.0
  20
            .600
                                 .500
                                            .500
                                                                          .0
                        .000
                                                                          .0
  21
             .100
                                   .000
                                              .000
                                                          60.0
                                   .000
                                                                         .0
  22
             .100
                        .000
                                              .000
                                                           60.0
                       .000 .000 .000 60.0
.000 .000 .000 60.0
  23
             .100
                                                                         .0
             .100
                                                                          .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 60.000000 NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 100.000000
SYSTEM TYPE, (IECN)
                      2
SUPPLY AIR CFM (SACFM) 16500.000000
ECONOMIZER HIGH TEMP LIMIT F 100.000000
SYSTEM SUPPLY AIR START TIME HR 1.000000
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 65.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)
                                                   1.000000
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP)
                                            1.000000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1128650.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 1410813.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                       .369 .400
.718 .800
                                                                           .451
812
.100
                             .286 .300 .369
         .191 .200
           .537
                                             .700
 .500
                      .600
                                 .625
                                                                             .812
                    1.00
.900
          .906
                                 1.00
CHILLER TYPE (ITYPCH)
                                 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN) 0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                                           .000
                                                                 .000
 .000 .000 .000 .000 .000
                 .000 .000
                                                                  .000
           .000
                                            .000
 .000
                                                       .000
                                                                              .000
           .000
 .000
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BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	N				
			SOLAR		DOOR				VENT	
			THRU		AND				AND	
	'H LOAD				SLAB			WINDOW		
JAN			3.				0.		0.	
	-241.	LOSS		-3.	-4.	0.	-2.	-2.	-262.	0.
FEB	0.	GAIN	4.	0.	0.	0.	0.	0.	0.	0.
	-199.	LOSS		-2.	-3.	0.	-1.	-2.	-219.	0.
MAR	. 0.	GAIN	5.	0.	0.	0.	0.	0	0.	0.
	-177.	LOSS		-2.	-3.	0.			-201.	0.
									201.	0.
APR	.00	GAIN	4.44			.00	.51	.01	1.13	.00
	-60.57	LOSS		-1.24	-1.64	.00	33	82 -	87.39	.00
MAV	.00	GAIN	4 70	7.7	.02	0.0				
	-15.42	LOSS	4.72		-1.00	.00				.00
	13.42	1055		60	-1.00	.00	06	48 -	45.90	.00
JUN	.00	GAIN	4.79	.37	.02	.00	.89	.01	1.36	.00
	12	LOSS		70	90	.00				.00
JUL	.00	CATN	4 00	4.5	••					
001	02	GAIN LOSS	4.88				.88		1.73	.00
	02	пова		/5	95	.00	08	47 -	31.37	.00
AUG	.00	GAIN	4.28	.36	.02	.00	.85	.01	1.48	.00
	.00	LOSS		71	84	.00	05		30.75	.00
משפ	.00	CATN	4 01	2.0	0.0	2.0				
	-13.06		4.01		.03 -1.09		.62	.01		.00
	-13.06	позэ		94	-1.09	.00	09	54 -	41.14	.00
OCT	.00	GAIN	3.67	.09	.01	.00	.32	.01	.98	.00
	-56.20	LOSS		-1.30	-1.47	.00				.00
NOV	0.	GAIN	2	0	0.	0.	•	•		
1101	-126.		٦.	-2.		0.	0. -1.	0. -1.		0.
	120.	Lobo		۷.	-2.	0.	- I .	-1.	-149.	0.
DEC	0.	GAIN	3.	0.	0.	0.	0.	0.	0.	0.
	-269.	LOSS		-3.	-4.	0.	-2.	-2.	-288.	0.
тОт	0.	CATN	48.	2	0	•	_	_		
	-1158.							0.		0.
	-1136.	TOSS		-13.	-24.	υ.	-8.	-12	1466.	0.
	HEATING		-1128					AMBI	ENT TEMP	3.
MAX	COOLING	LOAD=		0. B	TUH ON D	EC 31 H	OUR 24	AMBI	ENT TEMP	42.

ZONE UA BTU/HR-F 433.0

BEACON Energy Analysis By EMC Engineers, Inc. 630ARGD.I

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

									FAN T	OTAL
INTERN		PNAT.	SPACE		,	COIN-	LIGHTING	DDOCESS	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND			MILLION
MONTH								BTU	BTU	BTU
JAN	60.	67.		4		64.	3.02	29.07	8.35	27.27
			59.	26	24	12.				
FEB	61.	73.				50.	2.73	26.26	6.97	24.06
			59.	2	1	16.				
MAR	63.	83.		11	17	64.	3.02	29.07	7.13	26.05
			60.	15	1	22.				
APR	67.	89.		29	19	69.	2.92	28.13	6.35	24.66
			60.	11	1	34.				
MAY	72.	99.		27	19	76.	3.02	29.07	6.67	25.59
			60.	11	1	39.				
JUN	79.	101.				78.	2.92	28.13	6.06	24.37
			60.	19	2	57.				
JUL	84.	110.				92.	3.02	29.07	6.35	25.27
			60.	10	5	57.				
AUG	82.	106.		12	19	84.	3.02	29.07	6.63	25.55
			61.	25	1	58.				
SEP	76.	106.		2		87.	2.92	28.13	5.83	24.14
			60.	26	1	45.				
OCT	67.	88.		7	16	65.	3.02	29.07	6.79	25.71
			60.	10	24	34.				
NOV	63.	80.		25	17	58.	2.92	28.13	6.86	25.17
			60.	2	24	20.				
DEC	61.	76.					3.02	29.07	6.83	25.75
			53.	18	7	-1.				
YEAR							35.55	342.26	80.82	303.58

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF F	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WERE	NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	658	0	0	0	1058E+07	.0000
FEB	550	0	0	0	9312E+06	.0000
MAR	534	0	0	0	8341E+06	.0000
APR	278	0	0	0	5701E+06	.0000
MAY	125	0	0	0	3965E+06	.0000
JUN	5	0	0	0	4143E+05	.0000
JUL	2	0	0	0	1095E+05	.0000
AUG	0	0	0	0	.0000	.0000
SEP	114	0	0	0	2731E+06	.0000
OCT	322	0	0	0	4945E+06	.0000
NOV	424	0	0	0	7996E+06	.0000
DEC	564	0	12	0	1129E+07	.0000
YEAR	3576	0	12	0	1129E+07	.0000

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	371.89	.00	3.02	29.07	2.45	27.27	8.7
FEB	305.90	.00	2.73	26.26	2.04	24.06	8.7
MAR	277.70	.00	3.02	29.07	2.09	26.05	8.7
APR	111.89	.00	2.92	28.13	1.86	24.66	8.7
MAY	40.23	.00	3.02	29.07	1.95	25.59	8.7
JUN	1.34	.00	2.92	28.13	1.77	24.37	8.7
JUL	.54	.00	3.02	29.07	1.86	25.27	8.7
AUG	.00	.00	3.02	29.07	1.94	25.55	8.7
SEP	34.02	.00	2.92	28.13	1.71	24.14	8.7
OCT	116.22	.00	3.02	29.07	1.99	25.71	8.7
NOV	205.34	.00	2.92	28.13	2.01	25.17	8.7
DEC	381.64	.00	3.02	29.07	2.00	25.75	8.7
YEAR	1846.71	.00	35.55	342.26	23.68	303.58	8.7

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 629073. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL KITCHEN AREA - ZN 1 ECO-2 INSTALL RIGID INSULATION

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	, PF FACTOR	AVG. MBT. DEG. F	MAX SYS TEMP. D DEG.	RIFT	SYSTEM NOT	WHEN LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
				_						
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	1058E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	9312E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	8341E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	5701E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	3965E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	4143E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	1095E+05
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	2731E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	4945E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	7996E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	12	.0000	1129E+07

WINDOW HEIGHT FT (WNDH)

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BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
FILE NAME MO
STATION 13995
               YEAR 1955
                            37.750000
SITE LATITUDE DEG (AL1)
                                           1158.000000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                             56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                               70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 76646.000000
FLOOR AREA (SQFT) 7190.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 936800.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -836640.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 71900.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 700.000000
INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
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    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

                                                          1.00 1.00
1.00 1.00
1.00 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 5.480000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 39779.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 213.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                 WALL DATA
                                1 2
WALL NUMBER
                                                    3
                              .00 90.00 180.00 -90.00
.0 1471.0 1446.0 1487.0
.0 144.0 84.0 128.0
10.0 10.0 10.0 10.0
AZIMUTH ANGLE (AZ)
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
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WINDOW WIDTH FT (WNDW) .0 14.4 8.4 12.8 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.243	.245	.243
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01822	.01837	.01822
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5 N=6	.00003	.00003	.00003	.00003
N=2	.00283	.00280	.00283	.00280
N=3	.01017	.01008	.01017	.01008
N=4	.00498	.00494	.00498	.00494
N=5	.00037	.00036	.00037	.00036
N=6	*****	*****	*****	*****
NOMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS			_	•
N=1	1.00000	1.00000	1.00000	1.00000
DN FACTORS N=1 N=2 N=3 N=4 N=5	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=6	*****	*****	*****	******
ROOF AREA SQFT (AROF) 7190	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.6967	39E-02	-	
ROOF B TRANSFER FUNCTIONS (BNR)			
.951E-03 .982E-02 .593E-02	.266E-03	380.	380.	
ROOF D TRANSFER FUNCTIONS (DNR	}			
1.00600 .822E-01	300E-03	999.	999.	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00			
ERIBIONI WIDIN FI (SKW) 0.0	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	0.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKILIGHT SHADING COEFFICIENT (SHSK) 0	.000000E+00)	
SUMMER START MONTH AND DAY FOR	SHSK (MST	, NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	HSK (MND, NI	OND)	1	1
SKY LIGHT AREA SQFT (ASKY)	D.00000E+0	0 0		
DAYTIME SKY LIGHT U BTU/SQFT-HE	R-F (SKYU)	1.2	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKYU	JN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	TERNAL SPAC	CE (FAP)	5.000000E	1-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	39972.	56700.	80200.		
HOUR	H	OURLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	75.0
2	.100	.000	.000	.000	70.0	75.0
3	.100	.000	.000	.000	70.0	75.0
4	.100	.000	.100	.100	70.0	75.0
5	.800	1.000	.500	.500	70.0	75.0
6	1.000	1.000	1.000	1.000	70.0	75.0
7	1.000	.800	1.000	1.000	70.0	75.0
8	1.000	.500	1.000	1.000	70.0	75.0

```
9
            1.000
                    .300 .200
                                          .200
                                                       70.0
                                                                  75.0
                     .100
  10
            1.000
                                .200
                                           .200
                                                       70.0
                                                                  75.0

    1.000
    .500
    .800
    .800

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    1.000
    1.000
    1.000

    1.000
    1.000
    1.000
    1.000

    1.000
    .200
    .200
    .200

  11
                                                       70.0
                                                                  75.0
  12
                                                       70.0
                                                                  75.0
  13
                                                       70.0
                                                                   75.0
  14
                                                       70.0
                                                                   75.0
                                           .200
                      .200
                                 .200
  15
           1.000
                                                        70.0
                                                                   75.0

    1.000
    .200
    .200
    .200

    1.000
    1.000
    1.000
    1.000

    1.000
    1.000
    1.000
    1.000

  16
                                                        70.0
                                                                   75.0
  17
                                                        70.0
                                                                   75.0
  18
                                                        70.0
                                                                   75.0
                      .800
                               .200
  19
           1.000
                                          .200
                                          .200
.100
.000
                                                        70.0
                                                                   75.0
                       .300
  20
            .600
                                 .100
                                                        70.0
                                                                  75.0
  21
                                .000
             .100
                                                       70.0
                       .000
                                                                  75.0
                                                      70.0
  22
             .100
                       .000
                                .000
                                                                  75.0
                       .000 .000 .000 70.0
.000 .000 .000 70.0
                      .000
  23
             .100
                                                                  75.0
  24
             .100
                                                                  75.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 60.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 60.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 14000.000000
ECONOMIZER HIGH TEMP LIMIT F 65.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                                   24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
                                  60.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP)
                                         1.500000
HEATING PLANT RATED OUTPUT BTU (HFLOT) 936800.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 1171000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
.100 .191 .200 .286 .300 .369
                                                            .400
                                                                      .451
.500 .537 .600
.900 .906 1.00
 .500
                               .625
                                         .700
                                                   .718
                                                              .800
                                                                        .812
                               1.00
CHILLER TYPE (ITYPCH)
                               0
COOLING PLANT RATED OUTPUT BTU (CFLOT) 836640.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 154670.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.100 .200 .200 .250 .300 .310
.500 .450 .600 .550 .700 .650
                                                   .310 .400
.650 .800
                                                                        .370
                                                                        .760
        .880 1.00 1.00
 .900
```

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR		PARTI'	R			VENT	
			THRU						AND	
	H LOAD	~~ ***	WINDOW		' SLAB	BSMT		WINDOV		LATENT
JAN			5.						0.	
	-93.	LOSS		-7.	-7.	0.	-24.	-5.	-109.	0.
FEB	.07	GATN	6 47	nn	0.0	0.0	0.1	0.0	.00	0.4
	-71.21				-5.91				-92.28	
	,	2000		0.13	3.71	.00	-17.00	7.24	- 32.20	.00
MAR	5.22	GAIN	8.10	.07	.00	.00	.75	.00	.01	1.42
	-55.25				-5.50				-85.26	
APR	26.41	GAIN	8.60	.39	.04	.00	3.10	.03	.54	7.08
	-19.53	LOSS		-3.36	-3.25	.00	-6.60	-2.33	-49.23	.00
MAY	59.64	GAIN	9.54						1.72	
	-3.66	LOSS		-2.16	-1.87	.00	-2.53	-1.29	-29.83	.00
		~		_		_				
JUN	124.		9.						5.	
	0.	LOSS		-1.	-1.	0.	-1.	-1.	-11.	0.
JUL	156.	GAIN	. 10	2	1	0	13.	1	12	74.
		LOSS	20.	-1.		0.				0.
					٠.	٠.	٥.	٥.	, .	٠.
AUG	149.	GAIN	9.	2.	1.	0.	11.	0.	9.	75.
	0.			-1.	-1.	0.	0.	Ο.	-8.	0.
SEP		GAIN							4.64	
	-4.62	LOSS		-1.91	-1.46	.00	-2.48	-1.03	-22.52	.00
	26.06						1.29			10.35
	-16.83	LOSS		-3.60	-3.13	.00	-7.84	-2.19	-46.26	.00
NOV	6.99	GATN	4.53	02	0.0	0.0	1.8	0.0	.01	2 76
		LOSS			-4.53	00	-14.18			.00
				5.01	1.55		11.10	3.17	07.01	.00
DEC	0.	GAIN	4.	0.	0.	0.	0.	0.	0.	0.
	-89.				-7.				-104.	
TOT	646.	GAIN	87.	7.	3.	0.	51.	2.	33.	297.
	-396.	LOSS		-46.	-41.	0.	-114.	-29.	-632.	0.
MAX	HEATING	LOAD=	-405	333. 1	BTUH ON	DEC 18	HOUR 4	AMB	IENT TEM	IP 1.
MAX	COOLING	LOAD=	472	820. 1	BTUH ON	JUL 28	HOUR 17	AMB	IENT TEM	IP 92.

ZONE UA BTU/HR-F 1594.4

YEAR

BEACON Energy Analysis By EMC Engineers, Inc. 630B.I

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

INTERNA	ΔΤ.								FAN TO	OTAL
LIVIERNA	INTE		SPACE URE F			COIN-	LIGHTING THOUSAND		HEAT MILLION	HEAT GAIR
MONTH					HR	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	76.	69.	4 29		64. 3 10.	3.83	24.53	11.38	53.78
FEB	71.	76.	69.	13 2		64. 15.	3.46	22.16	10.28	48.57
MAR	71.	77.	69.	12 4			3.83	24.53	11.38	53.78
APR	73.	77.	69.	30 9		82. 32.	3.71	23.74	11.01	52.04
MAY	75.	77.	70.	28 11			3.83	24.53	11.38	53.78
JUN	76.	77.	70.				3.71	23.74	11.01	52.04
JUL	76.	77.	71.		13 4		3.83	24.53	11.38	53.78
AUG	76.	77.	70.		13 4		3.83	24.53	11.38	53.78
SEP	75.	77.	70.	3 15	13 3		3.71	23.74	11.01	52.04
OCT	73.	77.	70.	4 28	13 4		3.83	24.53	11.38	53.78
NOV	72.	76.	69.	8 3	13		3.71	23.74	11.01	52.04
DEC	70.	76.	69.	23 18	18 3		3.83	24.53	11.38	53.78

45.13 288.87 134.00 633.20

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM I	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	657	20	0	0	3619E+06	.0000
FEB	543	20	0	0	3190E+06	.7472E+05
MAR	503	86	0	0	3047E+06	.2533E+06
APR	241	230	0	0	1956E+06	.2854E+06
MAY	64	425	0	0	1374E+06	.3451E+06
JUN	6	548	0	0	2716E+05	.4399E+06
JUL	0	654	0	0	.0000	.4728E+06
AUG	4	643	0	0	3306E+05	.4395E+06
SEP	80	458	0	0	1215E+06	.4582E+06
OCT	241	241	0	0	1860E+06	.3474E+06
NOV	430	114	0	0	2713E+06	.2736E+06
DEC	656	15	0	0	4053E+06	.8103E+05
YEAR	3425	3454	0	0	4053E+06	.4728E+06

SYSTEM TOTALS

	ENE HEATING COOLING MILLION THOUSAN		Y CONSUMPT LIGHTING THOUSAND	TION PROCESS MILLION	TO FANS THOUSAND	OTAL INTERNAL HEAT GAIN MILLION	MAXIMUM ELECTRIC DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	190.72	.00	3.83	24.53	3.33	53.78	12.1
FEB	153.79	.01	3.46	22.16	3.01	48.57	21.2
MAR	133.39	.43	3.83	24.53	3.33	53.78	26.2
APR	58.56	1.95	3.71	23.74	3.23	52.04	27.3
MAY	14.64	3.88	3.83	24.53	3.33	53.78	29.3
JUN	1.34	7.20	3.71	23.74	3.23	52.04	33.7
JUL	.00	8.94	3.83	24.53	3.33	53.78	35.5
AUG	.89	8.63	3.83	24.53	3.33	53.78	33.7
SEP	18.01	5.45	3.71	23.74	3.23	52.04	34.7
OCT	56.28	1.88	3.83	24.53	3.33	53.78	29.4
NOV	109.94	.60	3.71	23.74	3.23	52.04	26.9
DEC	189.15	.04	3.83	24.53	3.33	53.78	21.2
YEAR	926.72	39.00	45.13	288.87	39.26	633.20	35.5

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 227639. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 630B.I

BLDG 630 - MESS HALL DINING AREA - ZONE 2 BASELINE

OTHER MONTHLY STATISTICS

				OIH.	EK MONIU	.כ זע	IHIIDI	TC2		
	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.							S WHEN	MUMIXAM	MUMIXAM
	SURF.	SURF.		AVG.	MAX SYS			M LOADS	COOLING	HEATING
	BTU/	BTU/		MBT.	TEMP. D			MET	LOAD	LOAD
	SQFT-	SQFT-		DEG.	DEG.		COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	3619E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.7472E+05	3190E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2533E+06	3047E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2854E+06	1956E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3451E+06	1374E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	4300E:06	2716E+05
JON	2047.	1993.	1.000	12.	0.	0.	U	U	.43200	
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.4728E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.4395E+06	3306E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	4582E+06	1215E+06
OBI	1050.	13/1.	1.000	00.	٠.	٠.	Ū	· ·		,
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3474E+06	1860E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2736E+06	2713E+06
DEC	883.	604.	1.000	35.	0.	ο.	0	0	.8103E+05	4053E+06

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL. ----- PROGRAM CONTROL OPTIONS -----COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000 1 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA -----*****REAL WEATHER FROM DISK****** FILE NAME MO STATION 13995 YEAR 1955 37.750000 SITE LATITUDE DEG (AL1) ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 76646.000000 FLOOR AREA (SQFT) 7190.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 936800.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -836640.000000 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 71900.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 700.000000 INFILTRATION PROFILE
 1.00
 1.00
 1.00
 1.00

 1.00
 1.00
 1.00
 1.00

 1.00
 1.00
 1.00
 1.00
 1.00 1.00 1.00 1.00 1.00 A FACTOR IN INFILTRATION EQUATION (CINA) 5.480000E-01 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 39779.000000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 213.000000 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 49.000000 30 WINDOW GLASS NUMBER (NG) DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01 WINDOW SHADING FACTOR (SHD) 5.900000E-01 WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	.0	1471.0	1446.0	1487.0
WINDOW AREA SQFT (AWND)	.0	144.0	84.0	128.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	.0	14.4	8.4	12.8
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	.0	.0

MAX SOLAR WITH NO SHADE (SOLMX)				
U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.064	.064	.064	.064
CN FACTORS	.00176	.00176	.00176	.00176
CN FACTORS NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016 .00086
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	*****	*****	.00008	*****
N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND)	6	6	6	6
DI TACTORD				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728	.00728
N=6	00002	00002	00002	00002
N=1 N=2 N=3 N=4 N=5 N=6 ROOF AREA SQFT (AROF) 7190	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-02		
ROOF TRANS FUNCTIONS USED (1=YI			1	
ROOF C TRANSFER FUNCTION (CNR)				
ROOF B TRANSFER FUNCTIONS (BNR)				
.951E-03 .982E-02 .593E-02	•	380.	380.	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00600 .822E-01	300E-03	999.	999.	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	000000E+00			
SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO				
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.00000E+0	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST	,NDST)	1	1
SUMMER END MONTH AND DAY FOR SI	HSK (MND, N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-H	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	5.000000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR - PEOPLE	 PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	39972.	56700.	80200.		
HOUR	HO	OURLY FRAC	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	75.0
2	.100	.000	.000	.000	70.0	75.0
3	.100	.000	.000	.000	70.0	75.0
4	.100	.000	.100	.100	70.0	75.0
5	.800	1.000	.500	.500	70.0	75.0
6	1.000	1.000	1.000	1.000	70.0	75.0
7	1.000	.800	1.000	1.000	70.0	75.0
8	1.000	.500	1.000	1.000	70.0	75.0

9	1.000	.300	.200	.200	70.0	7	75.0	
10	1.000	.100	.200	.200	70.0	7	75.0	
11	1.000	.500	.800	.800	70.0	7	75.0	
12	1.000	1.000	1.000	1.000	70.0	7	75.0	
13	1.000	1.000	1.000	1.000	70.0	7	75.0	
14	1.000	.200	.200	.200	70.0	7	75.0	
15	1.000	.200	.200	.200	70.0	7	75.0	
16	1.000	.200	.200	.200	70.0	7	75.0	
17	1.000	1.000	1.000	1.000	70.0	7	75.0	
18	1.000	1.000	1.000	1.000	70.0	7	75.0	
19	1.000	.800	.200	.200	70.0	7	75.0	
20	.600	.300	.100	.100	70.0	7	75.0	
21	.100	.000	.000	.000	70.0	-	75.0	
22	.100	.000	.000	.000	70.0	7	75.0	
23	.100	.000	.000	.000	70.0	7	75.0	
24	.100	.000	.000	.000	70.0	7	75.0	
NO HEAT	ING ABOVE AMB	IENT TEMP	OF (THLK	OT) 60	.000000			
NO COOL	ING BELOW AMB	IENT TEMP	OF (TCLK	OT) 60	.000000			
SYSTEM '	TYPE, (IECN)	2	2					
SUPPLY 1	AIR CFM (SACF	M) 14000	0.00000					
ECONOMI:	ZER HIGH TEMP	LIMIT F	65.0	00000				
SYSTEM :	SUPPLY AIR ST	ART TIME H	IR 0.00	0000E+00				
SYSTEM	SUPPLY AIR ST	OP TIME HE	24	.000000				
SYSTEM I	MIXED AIR TEM	P(TMXAIR)	60.00	00000				
MIN OUT	SIDE AIR FRAC	TION OF SA	ACFM (OAFR)	1.0000	00E-01			
FAN EFF	ICIENCY (EFAN) 5.500	000E-01					
	AL PRESSURE I		(DP)	1.500000				
HEATING	PLANT RATED	OUTPUT BTU	J (HFLOT)	936800.000	000			
HEATING	PLANT RATED	INPUT BTU	(HFLIN)	1171000.000	000			
HEATING	PLANT PART L			r Table (Pl	H)			
.100	.191	.200	.286	.300	.369	.400	. 4 5	51
.500	.537	.600	.625	.700	.718	.800	.83	12
.900	.906	1.00	1.00					
	TYPE (ITYPCH	·	0					
	PLANT RATED			836640.00	0000			
	PLANT RATED			154670.000				
	PLANT PART L			,	•			
.100	.200	.200	.250	.300	.310	.400	.3	
.500	.450	.600	.550	.700	.650	.800	.76	50
.900	.880	1.00	1.00					

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR		PARTITN DOOR	ī			\$ 7173.7 <i>1</i> 1	,
			THRU		AND				VENT AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WAT.T.	WINDO	M INEI WND	LATENT
JAN	0.	GAIN	5.	0.	0.	0.	0.		0.	
	-76.	LOSS		-7.	-7.				-109.	0.
										٠.
FEB	.08	GAIN	6.47	.00	.00	.00	.00	.00	.00	.04
	-59.20	LOSS		-6.16	-5.94	.00	-4.68	-4.26	-93.16	.00
MAR	5.19	GAIN			.00	.00	.04	.00	.01	1.38
	-46.30	LOSS		-5.57	-5.52	.00	-3.50	-3.95	-85.94	.00
	25.25		8.60			.00	.43	.03	.54	6.98
	-16.69	LOSS		-3.38	-3.27	.00	-1.46	-2.34	-49.91	.00
B#75.37	FC 20	63.7								
MAY					.14	.00	1.30	.10	1.72	20.66
	-3.53	LOSS		-2.14	-1.85	.00	28	-1.28	-29.72	.00
TITAL	115	(12 T);	•	_						
OON	115. 0.	LOSS	9.	1.	0.					
	0.	LUSS		-1.	-1.	0.	0.	-1.	-11.	0.
JUL	144.	GAIN	10.	2			_			
001	0.	LOSS	10.	2. -1.			3.			71.
	٠.	1000		-1.	0.	0.	0.	0.	-7.	Ο.
AUG	138.	GAIN	9.	2	1.	0	3.	0	•	
		LOSS			-1.		٥. ٥	0.	9. -8.	71.
						ο.	0.	٠.	-8.	0.
SEP	86.75	GAIN	7.22	.78	.35	.00	1.28	26	4 61	12 12
	-4.17	LOSS		-1.91	-1.47	.00	40	-1.03	-22.80	00
	25.88			.19	.05	.00	.16	.04	.69	10.17
	-13.60	LOSS		-3.63	-3.17	.00	-1.90	-2.21	-47.75	.00

			4.53		.00	.00	.01	.00	.01	2.80
	-33.58	LOSS		-5.04	-4.57	.00	-3.69	-3.20	-69.11	.00
DEC	0.	CATA								
ששע	-73.		4.	0.	0.	0.	0.	0.	0.	0.
	-/3.	LUSS		-7.	-7.	0.	-6.	-5.	-105.	0.
тот	603	CAIN	07	~	2	•				
101	-326.	LOCC	87.	1.	3.	0.	12.	2.	33.	284.
	J20.	BODD		-40.	-41.	υ.	-28.	-29.	-638.	0.
MAX I	HEATING	T-OAD-	-3563	360 PT	UH ON DE	C 10 **	TOTTE =	***		
MAX	COOLING	LOAD=	4460)13 PT	THE ON SE	D 2 to F	IOUR 2		IENT TEM	- 3.
		0.12	4400	,_J, DI	OII ON SE	r Z H	IOUR 13	AMB]	ENT TEM	P 93.

ZONE UA BTU/HR-F 803.2

BEACON Energy Analysis By EMC Engineers, Inc. 630BFG.I BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

INTERN	ΣΔΤ.								FAN 7	TOTAL
11112141	INTE		SPACE			COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
MONTHIT			URE F			CIDENT	THOUSAND			MILLION
MONTH	AVG.	MAX	MIN	DAY	HR .	AMBT.	KWH	BTU	BTU	BTU
JAN	71.	76.		4	13	64.	3.83	24.53	11.38	53.78
			69.	29	3	10.				
FEB	71.	76.		9	13	57.	3.46	22.16	10.28	48.57
			69.				3.10	22.10	10.20	40.37
MAR	72	77.								
PLAK	12.	//.	69.	12 4	13 3	74. 17.	3.83	24.53	11.38	53.78
APR	73.	77.	70.	24 1	13 1	80. 33.	3.71	23.74	11.01	52.04
			70.	1	Τ.	33.				
MAY	74.	77.			13	85.	3.83	24.53	11.38	53.78
			70.	11	3	38.				
JUN	75.	77.		27	13	88.	3.71	23.74	11.01	52.04
			70.	17	4	56.				
JUL	76.	77.		15	13	93.	3.83	24.53	11.38	53.78
			70.		4	57.	3.03	24.55	11.50	55.76
AUG	76.	77.		12	13	86.	2 02	04 50		
AUG	70.	,,.	70.			54.	3.83	24.53	11.38	53.78
SEP	75.	77.	70.	3 15	13 3	89. 41.	3.71	23.74 \	11.01	52.04
			,	13	,	41.				
OCT	73.	77.		5	13	80.	3.83	24.53	11.38	53.78
			70.	28	3	32.				
NOV	72.	76.		8	13	77.	3.71	23.74	11.01	52.04
			70.	3	3	18.				
DEC	71.	76.		29	13	63.	3.83	24.53	11.38	53.78
			69.	18	3	2.				23.,0
YEAR							45 13	288 87	134.00	633 20
 -							±0.40	200.0/	134.00	033.20

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	628	27	0	0	3264E+06	.0000
FEB	506	= -	-	-		
		38	0	0	2829E+06	.7871E+05
MAR	473	95	0	0	2710E+06	.2475E+06
APR	223	234	0	0	1700E+06	.2854E+06
MAY	72	407	0	0	1229E+06	.3311E+06
JUN	10	501	0	0	3178E+05	.4212E+06
JUL	1	610	0	0	-9935.	.4404E+06
AUG	5	593	0	0	3528E+05	.4225E+06
SEP	80	444	0	0	1093E+06	.4460E+06
OCT	214	260	0	0	1650E+06	.3433E+06
NOV	395	131	0	0	2359E+06	.2765E+06
DEC	616	20	0	0	3564E+06	.1124E+06
YEAR	3223	3360	0	0	3564E+06	.4460E+06

SYSTEM TOTALS

	HEATING	ENERG COOLING	Y CONSUMPT LIGHTING	'ION PROCESS	T(FANS	OTAL INTERNAL HEAT GAIN	MAXIMUM ELECTRIC
MONTH	MILLION	THOUSAND KWH	THOUSAND KWH	MILLION BTU	THOUSAND KWH	MILLION BTU	DEMAND KW
JAN	171.17	.00	3.83	24.53	3.33	53.78	12.1
FEB	136.42	.01	3.46	22.16	3.01	48.57	21.2
MAR	120.69	.43	3.83	24.53	3.33	53.78	26.1
APR	53.05	1.86	3.71	23.74	3.23	52.04	27.3
MAY	16.24	3.67	3.83	24.53	3.33	53.78	28.8
JUN	2.23	6.62	3.71	23.74	3.23	52.04	32.7
JUL	.22	8.26	3.83	24.53	3.33	53.78	33.7
AUG	1.12	7.94	3.83	24.53	3.33	53.78	32.7
SEP	17.89	5.18	3.71	23.74	3.23	52.04	34.0
OCT	49.18	1.85	3.83	24.53	3.33	53.78	29.3
NOV	97.56	.61	3.71	23.74	3.23	52.04	27.0
DEC	167.45	.04	3.83	24.53	3.33	53.78	22.0
YEAR	833.22	36.46	45.13	288.87	39.26	633.20	34.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 213430. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-1 INSTALL FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

				0 1 1 1			+			
	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT	SYSTEN NOT	S WHEN 1 LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	3264E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.7871E+05	2829E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2475E+06	2710E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2854E+06	1700E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3311E+06	1229E+06
NUL	2647.	1993.	1.000	72.	0.	0.	0	0	.4212E+06	3178E+05
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.4404E+06	-9935.
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.4225E+06	3528E+05
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.4460E+06	1093E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3433E+06	1650E+06
NOV	1039.	732.	1.000	47.	0.	Ο.	0	0	.2765E+06	2359E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.1124E+06	3564E+06

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BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
 ----- PROGRAM CONTROL OPTIONS -----
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK*****
  FILE NAME MO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1) 37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                   1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMPOF AIR IN BUILDING DEG F (TAO) 70.000000
TWITTAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 76646.000000
FLOOR AREA (SQFT) 7190.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 936800.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -836640.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 71900.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 700.000000
INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

                                                         1.00 1.00
1.00 1.00
                                                                                 1.00
                                                                  1.00
                                                                                 1.00
                                                                                  1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 5.480000E-01
B FACTOR IN INFILTRATION EQUATION (CINB)
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 39779.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 213.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                      WALL DATA
                                     1 2 3 4
                                - 2 3 4
.00 90.00 180.00 -90.00
.0 1471.0 1446.0 1487.0
.0 144.0 84.0 128.0
10.0 10.0 10.0
WALL NUMBER
AZIMUTH ANGLE (AZ)
                                                 90.00 180.00 -90.00
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
WINDOW HEIGHT FT (WNDH)
WINDOW WIDTH FT (WNDW) .0 14.4 8.4 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0
                                                                         12.8
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.055	.055	.055	.055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	00019
N=3	.00089	.00089	00089	00019
N=1 N=2 N=3 N=4 N=5 N=6	.00059	.00059	00059	00055
N=5	.00007	00007	00007	.00033
N=6	*****	******	******	.00007
NUMBER OF DN FACTORS (ND)	6	6	6	6
N=1 N=2 N=3 N=4 N=5	1 00000	1 00000	1 00000	1 00000
N=2	-1 66125	-1 66125	1.00000	1.00000
N=3	83196	93106	-1.00125	-1.66125
N=4	- 14500	14500	.83196	.83196
N=5	00613	14508	14508	14508
N=6	.00013	.00613	.00613	.00613
ROOF AREA SQFT (AROF) 7190	00002	00002	00002	00002
ROOF U VALUE BTU/HR-SQFT-F (URI	.000000			
ROOF TRANS FUNCTIONS USED (1=Y)	3.50	0000E-02		
POOF C TRANSFER FINCETON (CNR)	25, U=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR) ROOF B TRANSFER FUNCTIONS (BNR)	1.6967	39E-02		
.951E-03 .982E-02 .593E-02	2668 62	200		
ROOF D TRANSFER FUNCTIONS (DNR)	.2665-03	380.	380.	
1.00600 .822E-01 -	300E-03	999	999	
SKYLIGHT TILT DEGREES (TILT)	0.0000001	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999 000	200	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00	2222.000		
SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKC	W) 0.00	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0 0000	00F±00	
SKYLIGHT GLASS NUMBER (NS)	1	0.0000	001100	
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	000000E±00)	
SUMMER START MONTH AND DAY FOR	SHSK (MST	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	ISK (MND.NI	OND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	0.0		T
DAYTIME SKY LIGHT U BTU/SOFT-HR	-F (SKVII)	1 -	92998	
NIGHT TIME SKYLIGHT U BTU/SOFT-	HR-F (SKYT	IN)	1 292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPAC	E (FAP)	5.000000E	-01
		, ,		01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

KW							
LIGHTS		KW		•	PEOPLE		
HOUR HOURLY FRACTION OF PEAK			PROCESS			HEATING	COOLING
1 .100 .000 .000 .000 70.0 75.0 2 .100 .000 .000 .000 70.0 75.0 3 .100 .000 .000 .000 70.0 75.0 4 .100 .000 .100 .100 70.0 75.0 5 .800 1.000 .500 .500 70.0 75.0 6 1.000 1.000 1.000 1.000 70.0 75.0 7 1.000 .800 1.000 1.000 70.0 75.0	PEAK VAL	8.	39972.	56700.	80200.		
2 .100 .000 .000 .000 70.0 75.0 3 .100 .000 .000 .000 70.0 75.0 4 .100 .000 .100 .100 70.0 75.0 5 .800 1.000 .500 .500 70.0 75.0 6 1.000 1.000 1.000 1.000 70.0 75.0 7 1.000 .800 1.000 1.000 70.0 75.0 7 1.000 .800 1.000 1.000 70.0 75.0	HOUR	H	OURLY FRAC	TION OF PE	AK		
2 .100 .000 .000 .000 70.0 75.0 3 .100 .000 .000 .000 70.0 75.0 4 .100 .000 .100 .100 70.0 75.0 5 .800 1.000 .500 .500 70.0 75.0 6 1.000 1.000 1.000 70.0 75.0 7 1.000 .800 1.000 1.000 70.0 75.0 8 1.000 .500 1.000 70.0 75.0	1	.100	.000	.000	.000	70.0	75.0
4 .100 .000 .100 .100 .70.0 .75.0 .5 .800 1.000 .500 .500 .70.0 .75.0 .6 1.000 1.000 1.000 1.000 .70.0 .75.0 .7 1.000 .800 1.000 1.000 .70.0 .75.0 .7 1.000 .800 1.000 1.000 .70.0 .75.0	2	.100	.000	.000	.000	70.0	
4 .100 .000 .100 .100 70.0 75.0 5 .800 1.000 .500 .500 70.0 75.0 6 1.000 1.000 1.000 70.0 75.0 7 1.000 .800 1.000 1.000 70.0 75.0 8 1.000 70.0 75.0 75.0	3	.100	.000	.000	.000	70.0	75.0
6 1.000 1.000 1.000 70.0 75.0 7 1.000 .800 1.000 1.000 70.0 75.0	_	.100	.000	.100	.100	70.0	
6 1.000 1.000 1.000 1.000 70.0 75.0 7 1.000 .800 1.000 1.000 70.0 75.0	5	.800	1.000	.500	.500	70.0	75.0
75.0	6	1.000	1.000	1.000	1.000	70.0	
8 1,000 500 7,000 7,000	7	1.000	.800	1.000	1.000	70.0	75.0
	8	1.000	.500	1.000	1.000	70.0	

9	1.000	.300	.200	.200	70.0	75.	. 0
10	1.000	.100	.200	.200	70.0	75.	. 0
11	1.000	.500	.800	.800	70.0	75.	. 0
12	1.000	1.000	1.000	1.000	70.0	7 5.	. 0
13	1.000	1.000	1.000	1.000	70.0	75.	. 0
14	1.000	.200	.200	.200	70.0	7 5.	. 0
15	1.000	.200	.200	.200	70.0	75.	. 0
16	1.000	.200	.200	.200	70.0	75.	. 0
17	1.000	1.000	1.000	1.000	70.0	75.	. 0
18	1.000	1.000	1.000	1.000	70.0	75.	. 0
19	1.000	.800	.200	.200	70.0	75.	. 0
20	.600	.300	.100	.100	70.0	75.	. 0
21	.100	.000	.000	.000	70.0	75.	. 0
22	.100	.000	.000	.000	70.0	75.	. 0
23	.100	.000	.000	.000	70.0	75.	. 0
24	.100	.000	.000	.000	70.0	75.	. 0
NO HEAT	ING ABOVE AME	SIENT TEMP	. OF (THLK	OT) 60	.000000		
NO COOL	ING BELOW AME	BIENT TEMP	OF (TCLK	OT) 60	.000000		
SYSTEM	TYPE, (IECN)	:	2				
SUPPLY .	AIR CFM (SAC	M) 14000	0.00000				
ECONOMI	ZER HIGH TEMP	LIMIT F	65.00	00000			
	SUPPLY AIR ST			0000E+00			
SYSTEM	SUPPLY AIR ST	OP TIME H	24	.000000			
	MIXED AIR TEN	•					
MIN OUT	SIDE AIR FRAC	TION OF SA	ACFM (OAFR)	1.0000	00E-01		
	ICIENCY (EFAN		000E-01				
	AL PRESSURE 1		• •	1.500000			
	PLANT RATED						
	PLANT RATED						
	PLANT PART I						
.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				
	TYPE (ITYPC)		0	00.6640 00			
	PLANT RATED			836640.000			
	PLANT RATED						
	PLANT PART I	.200		.300	.310	.400	.370
.100	.200	.600	.250 .550	.700	.650	.800	.760
.500	.450			. 700	.050	.000	. /60
.900	.880	1.00	1.00				

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITI DOOR AND				VENT AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	0.	GAIN	5.	0.	0.	0.	0.	0.	0.	0.
	-75.	LOSS		-7.	-7.	0.	-5.	-5.	-109.	0.
	.08				.00		.00			
	-58.63	LOSS		-6.16	-5.94	.00	-4.02	-4.26	-93.25	.00
MAR	5.20	GAIN	8.10	.07	.00	.00	.04	.00	.01	1.38
	-45.92	LOSS		-5.57	-5.52		-3.02			
APR		GAIN	8.60	.39	.04		.39			6.98
	-16.59	LOSS		-3.38	-3.27	.00	-1.27	-2.34	-49.95	.00
MAY	56.21	GAIN	9.54	.84	.14	.00	1.14			20.66
	-3.55	LOSS		-2.13	-1.84	.00	26	-1.28	-29.67	.00
JUN			9.		0.	0.	2. 0.	0.	5.	57.
	0.	LOSS		-1.	-1.	0.	0.	-1.	-11.	0.
JUL			10.		1.		3.			
	0.	LOSS		-1.	0.	0.	0.	0.	-7.	0.
AUG	137.		9.				2.			
	0.	LOSS		-1.	-1.	0.	0.	0.	-8.	0.
SEP	86.44	GAIN	7.22		.35		1.11			
	-4.17	LOSS		-1.91	-1.47	.00	36	-1.03	-22.81	.00
	25.92				.05		.15			
	-13.49	LOSS		-3.63	-3.17	.00	-1.64	-2.21	-47.84	.00
NOV	7.41	GAIN	4.53	.02	.00		.01			
	-33.20	LOSS		-5.04	-4.57	.00	-3.18	-3.20	-69.21	.00
DEC	0.		4.	0.	0.	0.	0. -5.	Ο.	0.	0.
	-72.	LOSS		-7.	-7.	0.	-5.	-5.	-105.	0.
TOT			87.	7.	3. -41.	0.	10.	2.	33.	284.
	-323.	LOSS		-46.	-41.	0.	-24.	-29.	-639.	0.
MAX	HEATING	LOAD=	-354	759. E	BTUH ON D	EC 18	HOUR 2	AMB	IENT TEM	IP 3.
	COOLING		445	570. E	BTUH ON S	EP 2	HOUR 13	AMB	IENT TEM	IP 93.

ZONE UA BTU/HR-F 763.6

BEACON Energy Analysis By EMC Engineers, Inc. 630BRGD.I

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

FAN TOTAL

TNTERN	INTERNAL										
	INTE:	PERAT	URE F			COIN- CIDENT AMBT.	LIGHTING THOUSAND KWH	PROCESS MILLION BTU			
JAN	71.	76.	69.	4 29		64. 3 10.	3.83		11.38	53.78	
FEB	71.	76.	69.	9 2		57. 3 15.	3.46	22.16	10.28	48.57	
MAR	72.	77.	69.	12 12		74. 61.	3.83	24.53	11.38	53.78	
APR	73.	77.	70.				3.71	23.74	11.01	52.04	
MAY	74.	77.	70.	28 11			3.83	24.53	11.38	53.78	
JUN	75.	77.	70.			88.	3.71	23.74	11.01	52.04	
JUL	76.	77.	70.	15 10		93. 57.	3.83	24.53	11.38	53.78	
AUG	76.	77.	70.	12 25		86. 54.	3.83	24.53	11.38	53.78	
SEP	75.	77.	70.	3 15	13 3	89.	3.71	23.74	11.01	52.04	
OCT	73.	77.	70.	5 28		80.	3.83	24.53	11.38	53.78	
NOV	72.	76.	70.	8	13 3		3.71	23.74	11.01	52.04	
DEC	71.	76.	69.	29 18		63.	3.83	24.53	11.38	53.78	
YEAR							45.13	288.87	134.00	633.20	

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER O	F HOURS WHEN	MUMIXAM V	LOADS
		INCLUDING	LOADS W	ERE NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	626	27	0	0	3253E+06	.0000
FEB	505	38	0	0	2816E+06	.7971E+05
MAR	471	97	0	0	2700E+06	.2481E+06
APR	223	234	0	0	1696E+06	.2853E+06
MAY	72	407	0	0	1228E+06	.3308E+06
JUN	11	499	0	0	3266E+05	.4207E+06
JUL	1	607	0	0	1204E+05	.4396E+06
AUG	5	588	0	0	3582E+05	.4221E+06
SEP	80	442	0	0	1091E+06	.4456E+06
OCT	214	261	0	0	1644E+06	.3433E+06
NOV	394	132	0	0	2347E+06	.2767E+06
DEC	613	22	0	0	3548E+06	.1142E+06
YEAR	3215	3354	0	0	3548E+06	.4456E+06

SYSTEM TOTALS

	HEATING	ENERG COOLING	Y CONSUMPT	TION PROCESS	T FANS	MAXIMUM ELECTRIC	
MONTH	MILLION BTU	THOUSAND KWH	THOUSAND KWH	MILLION BTU	THOUSAND KWH	MILLION BTU	DEMAND KW
JAN	170.17	.00	3.83	24.53	3.33	53.78	12.1
FEB	135.82	.01	3.46	22.16	3.01	48.57	21.2
MAR	120.03	.43	3.83	24.53	3.33	53.78	26.1
APR	52.99	1.86	3.71	23.74	3.23	52.04	27.3
MAY	16.24	3.67	3.83	24.53	3.33	53.78	28.8
JUN	2.45	6.60	3.71	23.74	3.23	52.04	32.6
JUL	.22	8.23	3.83	24.53	3.33	53.78	33.7
AUG	1.12	7.89	3.83	24.53	3.33	53.78	32.7
SEP	17.89	5.16	3.71	23.74	3.23	52.04	34.0
OCT	49.15	1.85	3.83	24.53	3.33	53.78	29.3
NOV	97.16	.61	3.71	23.74	3.23	52.04	27.0
DEC	166.24	.04	3.83	24.53	3.33	53.78	22.0
YEAR	829.48	36.34	45.13	288.87	39.26	633.20	34.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 212854. BTU/(SQFT-YEAR)

BLDG 630 - MESS HALL DINING AREA - ZN 2 ECO-2 INSTALL RIDIG INSULATION

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.						HOID	WHEN	MANTHEM	147 177147714
	SURF.	SURF.		AVG.	MAX SYS	אישיני		1 LOADS	MAXIMUM	MAXIMUM
	BTU/	BTU/	7	AMBT.	TEMP. D		NOT		COOLING	HEATING
	SOFT-	SQFT-	PF	DEG.	DEG.			HEAT	LOAD	LOAD
MONTH	~	DAY	FACTOR	F	+	-	COOL	UEAI	BTU	BTU
			11101010	•	•	_				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	3253E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.7971E+05	2816E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2481E+06	2700E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.2853E+06	1696E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.3308E+06	1228E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.4207E+06	3266E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.4396E+06	1204E+05
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.4221E+06	3582E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.4456E+06	1091E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3433E+06	1644E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2767E+06	2347E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.1142E+06	3548E+06

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORMAT	TION:						
Building No: 63	30	Building Name	: Mess Hall				
Surveyed by: DM	IS	Date:	11/7/95		Building Use:	Dinng Facility	
Building Contact:					Phone No:		
Building Contact:					Phone No:		
OCCUPANCY:							
Number of Employees:	Mon./Fri.:	20		Schedule:	300	То	2100
	Tues./Thurs	20		-1-1	300	То	2100
	Wed.	20			300	То	2100
	Sat./Sun.	20			800	То	1900
Visitors Per Day:	Mon./Fri.:	270		Schedule:	600	То	2100
44	Tues./Thurs	270			600	То	2100
	Wed.	270			600	То	2100
	Sat./Sun.	270			900	То	1800
Comments:							
LIGHTING SCHEDULE	•						
Normal Occupancy:	MonFri.:			Schedule:	300	То	2100
tomai occupancy.	Sat./Sun.:			Scriedule.	800	To	1900
Cleaning Crew/2nd Shif				Schedule:	000	To	1900
g	Sat./Sun.:			Concadic.		To	
QUIPMENT SCHEDU							
an/AHU Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Chiller Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:			····	0	То	2400
Boiler Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
ux. Equipment Schedu	le:						
	MonFri.:			Schedule:		То	
4.1	Sat./Sun.:		***************************************			То	
	MonFri.:			Schedule:	- 40.400	То	
	Sat./Sun.:		-			То	
Comments:							

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No Building Name: Mess Hall

BUILDING ENVELOPE

EXTERIOR WALLS LIST OF EXT. WALL CONSTRUCTION TYPES Wall Wall Direction (N. Construction Wall Construction E, W, or S) No. Comments No. Description XW-1 XW-I Face Brick & CMU Ε XW-1; XW-5 XW-2 Face Brick, CMU, & Gyp. Board S XW-1 XW-3 Face Brick, CMU, & Ceramic Tile W XW-1; XW-5 XW-4 Face Brick, CMU, & Plaster Coat XW-5 Insulated Metal Panel WINDOWS LIST OF WINDOW TYPES Window Window Direction (N, Construction Window E, W, or S) No. Comments Construction No. Description W-1 N W-I Double Pane Clear Ε W-1 Double Pane Tinted W-2 S W-1 W-3 Single Pane with Storm Windows W W-1 W-4 Single Pane **ROOF CONSTRUCTION** LIST OF ROOF CONSTRUCTION TYPES Roof Roof Construction **Roof Construction** Location No. Comments No. Description Kitchen R-4 R-I BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceiling Dining R-4 R-2 R-3 BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g. BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaste R-4 Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling R-5 Tile Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster R-6 Clg.

E M C No. 1406-011 Date: 2/18/96

Prepared by: DMS

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 630 Building Name: Mess Hall

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INT	RIOR EQUIP	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall Direction (N,	Itam Na	No of Home	Comments	la Na	Description
E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
			D'.d	A-1	Interior Partitions
N	M-4	1	Distance from ext. wall to nearest int. wall	A-2	Wall Placards
N	F-4	1	is 4'-0" w/ a 5" ledge at the base of the	A-3	Drapery Valances
N N	A-2 A-6	2	exterior wall.	A-4 A-5	Drapery Rods Bleachers
N	A-0	1		A-5 A-6	Soap Dispenser
s	P-5	2	- 1	A-0	20ap Dispenser
S	E-2	2			Plumbing
S	E-2 E-5	1		P-1	Sinks
S	A-4	1		P-2	Commodes
J				P-3	Toilet Stalls
E	M-6	1		P-4	Water Fountains
E	C-4	1		P-5	Large Kitchen Sink
E	M-3	2	24' Long		
E	M-3	1	12' Long		HVAC Mechanical
E	M-3	1	3' Long	M-I	Floor Supply/Return Grilles
E	A-4	16		M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
w	M-3	2	24' Long	M-4	Thermostats / Space Temp. Sensors
w	M-3	1	12' Long	M-5	Wall mounted convection type heater
W	C-4	1		M-6	1/2" Hot & Cold Water Piping
W	M-3	1	3' Long		
W	P-3	2			
W	P-2	2			Electrical
				E-I	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Electrican Conduit
				E-5	Emergency light
				E-6	Electrical Disconnect
					Lighting
				L-I	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-1	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
	,	,		F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-I	Telephones - Wall Mounted
				(-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

FILE:

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY: 630AH1

EMC NO.: 1406-011

AJN

	AIR HANDLING UNIT	SURVEY OBSERVATIONS	
AHU-1	AHU NO.	ATTIC WEST	LOCATION (RM)
C.P.	REF. SYS. SERVING AHU	DINING ROOM	SERVES AREA

630

			UNIT TYP	E:			
х	SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&∨	
	MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
	NUMBER OF ZONES		OTHER				
	COMMENT:		, ,				

					NAMEPL					
N/A					MFG.					MODEL
15.0	SUPPLY FAN	HP	CENTURY		MFG.		323576-03			MODEL
	RET/EXH FAN	I HP	!		MFG.					MODEL
2800	CFM-HTG	2800	CFM-CLG	10%	MIN %OA	100%	MAX %OA	50%	% HTG AREA	SERVED
COMMEN	Γ:	(SF) 200-2	08V, 40 A, 3 PI	H						

	COILS:												
х	NONE	STM		HW	ELEC		MOD VLV	PREHEAT					
	NONE	STM	х	HW	ELEC	х	MOD VLV	HEATING					
×	NONE	STM		нw	ELEC		MOD VLV	REHEAT					
х	NONE	STM		нw	ELEC		MOD VLV	HUMID.					
	NONE	DX	×	cw		х	MOD VLV	COOLING					

	· · · · · · · · · · · · · · · · · · ·			OPERAT	ION:					
HOURS ON:		S	М	Т	w	Т	F	S	COMMENTS	
PRESENT START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES	
REQUIRED START TIME										
REQUIRED STOP TIME										
MONTHS ON:										
J F	М	Α	М	J	J	Α	s	0	N	D
1 1	1	1	1	1	1	1	1	1	1	1

	CONTROLS:												
		PNEUMATIC	х	ELECTRIC		ELEC'NIC		DDC	COMMENTS				
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			TIMECLOCK HAS NO PINS				
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL					
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER					
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Υ	RA (Y/N)	N	EA (Y/N)					
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER					
DEMAND LIMIT:	Y	YES		NO									
COMMENTS:	BARBER	COLEMAN CONTR	ROLS, EL	ECTRIC VALVE AC	TUATO	RS, HOA							

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

630

BLDG:

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS AJN

CHECKED BY: FILE: 630AH2

AIR HANDLING UNIT SURVEY OBSERVATIONS									
AHU NO.	ATTIC EAST	LOCATION (RM)							
REF. SYS. SERVING AHU	DINING ROOM	SERVES AREA							
	AHU NO.	DEE OVE SEENING							

			UNIT TYP	E:		
х	SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	H&V	
	MULTIZONE	DOUBLE DT	REHEAT	INDUCTION	VAV	
	NUMBER OF ZONE	S	OTHERS			
	COMMENT:		······································	·····		*

					NAMEPL	ATE:				**
N/A					MFG.		~~			MODEL
15.0	SUPPLY FAN H	IP	CENTURY	-	MFG.		323576-03			MODEL
	RET/EXH FAN	HP			MFG.				*****	MODEL
2800	CFM-HTG	2800	CFM-CLG	10%	MIN %OA	100%	MAX %OA	50%	% HTG AREA	SERVED
COMMENT	:	(SF) 200-2	08V, 40 A, 3 PI	H						

	COILS:												
X	NONE	STM		HW	ELEC	<u> </u>	MOD VLV	PREHEAT					
	NONE	STM	х	HW	ELEC	х	MOD VLV	HEATING					
Х	NONE	STM		HW	ELEC		MOD VLV	REHEAT					
X	NONE	sтм		HW	ELEC		MOD VLV	HUMID.					
	NONE	DX	х	cw		×	MOD VLV	COOLING					

			(OPERATI	ON:					
HOURS ON:		S	М	Т	w	Т	F	S	COMMENTS	· · · · · · · · · · · · · · · · · · ·
PRESENT START TIME		0	0	0	0	0	0		TIMECLOCK?	
PRESENT STOP TIME		2400	2400	2400	2400	2400	2400		YES, NO PINS	
REQUIRED START TIME									1.20, 1.0 1 1.10	
REQUIRED STOP TIME									 	
MONTHS ON:								**	L	
J F	М	Α	м	J	J	A	s	0	N	D
1 1	1	1	1	1	1	1	1	1	1	

				CONTRO	LS:				
		PNEUMATIC	х	ELECTRIC		ELEC'NIC]	DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		1	
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Υ	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Y	YES		NO					
COMMENTS:	BARBER	COLEMAN CONTR	OLS, EL	ECTRIC VALVE AC	TUATO	RS. HOA	L		<u>I</u>

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

630

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY: **DMS** CHECKED BY:

AJN

630HV1 FILE:

	AIR HANDLING UNIT	SURVEY OBSERVATION	NS
HV-1	AHU NO.	ATTIC WEST	LOCATION (RM)
	REF. SYS. SERVING AHU	KITCHEN	SERVES AREA

		UNIT TYP	E:	****	v. <u>19-14 110-1</u>	
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&∨	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
OTHER		OTHER				
COMMENT:					;	

					NAMEPL	ATE:				
N/A					MFG.					MODEL
5.0	SUPPLY FAN HP		N/A		MFG.					MODEL
	RET/EXH FAN HP				MFG.					MODEL
1800	CFM-HTG	0	CFM-CLG	100%	MIN %OA	100%	MAX %OA	50%	% HTG AREA	SERVED

	COILS:											
X	NONE	STM		HW	ELEC		MOD VLV	PREHEAT				
	NONE	sтм	х	HW	ELEC	х	MOD VLV	HEATING				
х	NONE	STM		нw	ELEC		MOD VLV	REHEAT				
х	NONE	STM		нw	ELEC		MOD VLV	HUMID.				
X	NONE	STM		HW	ELEC	7	MOD VLV	COOLING				

				(OPERAT	ION:					
HOURS	ON:		s	М	т	w	Т	F	s	COMMENTS	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	- · · · · · · · · · · · · · · · · · · ·
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400		·
REQUIRED	START TIME										
REQUIRED	STOP TIME					- //			412	·	
MONTH	S ON:					1				L	
J	F	М	A	м	J	J	А	s	0	N	D
1	1	1	1	0	0	0	0	0	1	1	1

			CONTROLS	S:		
	PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:	SINGLE STPT		DUAL SETPNT	SETBACK		
SPACE SETPOINT (oF):	OCC HEAT		UNOCC HEAT	OCC COOL	UNOCC COOL	
OTHER SETPOINTS (oF):	HOT DECK		COLD DECK	MIXED AIR	OTHER	
DAMPER CONTROL:	MIN OA (Y/N)		MAX OA (Y/N)	RA (Y/N)	EA (Y/N)	
	MA CONTROL		ECONO-DB	ECONO-ENT	OTHER	
DEMAND LIMIT:	YES	N	NO		-	
COMMENTS: BA	RBER COLEMAN CONTR	OLS				

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96

DMS

CHECKED BY: 630HV2

AJN

	BLDG:	630	FILE:	630HV2
	AIR HANDLING UNIT S	SURVEY OBSERVA	TIONS	
HV-2	AHU NO.	ATTIC EAST		LOCATION (RM)
	REF. SYS. SERVING AHU	KITCHEN		SERVES AREA

630

		UNIT TYP	E:			
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&V	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
OTHER		OTHER				
COMMENT:						

N/A					Luco			· · · ·		I
1/A			y		MFG.					MODEL
3.0	SUPPLY FAN HP		MARATHON		MFG.		SVE162TTDR			MODEL
	RET/EXH FAN HE	1			MFG.					MODEL
1800	CFM-HTG	0	CFM-CLG	100%	MIN %OA	100%	MAX %OA	50%	% HTG AREA	SERVED
COMMENT	Γ: (S	F) 208V	3PH, 9.4A, 17	30 RPM						******

				COILS:				
х	NONE	STM		нw	ELEC		MOD VLV	PREHEAT
	NONE	STM	×	HW	ELEC	х	MOD VLV	HEATING
х	NONE	sтм		HW	ELEC		MOD VLV	REHEAT
х	NONE	STM		нw	ELEC		MOD VLV	HUMID.
х	NONE	STM		HW	ELEC		MOD VLV	COOLING

					OPERAT	ION:					
HOURS C	N:		S	м	Т	w	Т	F	s	COMMENTS	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	71.00
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED S	START TIME								· · · · · · · · · · · · · · · · · · ·		
REQUIRED S	STOP TIME										
MONTHS	ON:									·	
J	F	М	Α	м	J	j	Α	s	0	N	D
1	1	1	1	0	0	0	0	0	1	1	1

				CONTROLS	S:		
		PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT	SETBACK		
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT	OCC COOL	UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK	MIXED AIR	OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	RA (Y/N)	EA (Y/N)	
		MA CONTROL		ECONO-DB	ECONO-ENT	OTHER	
DEMAND LIMIT:		YES	N	NO		```	
COMMENTS:	BARBER	COLEMAN CONTR	OLS				<u> </u>

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011 DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY:

AJN

	BLDG:	630	FILE:	630CV1
	BOILER & CONVERTE	R SURVEY OBSER	VATIONS	
CV-1	BOILER/CONVERTER NO.	MECH RM		LOCATION (RM)
C.P.	SOURCE OF HEATING (PLANT)	ALL		SERVES AREA

			UNIT TYPE	:	
	STEAM	PSIG	HW	ТЕМР.	BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:
х	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:
×	SPACE HEAT	DHW	OTHER		USE:
ОММЕ	NT:				% HTG AREA SERVED
					BB RADIATION ONLY

			NAMEPLATE:			
N/A	MFG.		MODEL	1300000	CAPACITY OUTPL	JT (BTUH)
			*	1300000	CAPACITY INPUT	(BTUH)
	MFG.		MODEL		CAPACITY OUTPU	JT (BTUH)
	<u> </u>				CAPACITY INPUT	(BTUH)
1.5	HW PUMP 1 - HP	MARATHON	MFG.	LVL145TDDR7	95330WFL	MODEL
	HW PUMP 2 - HP		MFG.			MODEL
	HW PUMP 3 - HP		MFG.			MODEL
COMMENT	r: 200V,	5.5A, 3PH, 1745 RPM				

				C	PERATI	ON:					
HOURS O	N:		s	м	т	w	т	F	s	COMMENT	
PRESENT ST	ART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT ST	OP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED S	TART TIME					J					
REQUIRED S	TOP TIME										
MONTHS	ON:										
J	F	М	Α	М	J	J	Α	s	0	N	٥

	PNEUMATIC	X	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	PSIG		HW SUPPLY			
RESET CONTROL (oF):	HW HIGH		HW LOW	OA LOW	OA HIGH	
BURNER CONTROLS	O2 TRIM (Y/N)		OTHER			
COMMENTS:	-					

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

DATE:

Feb-96

PREPARED BY:

EMC NO.: 1406-011

DMS

CHECKED BY:

AJN **630PMP**

	BLDG:	630	FILE:	630PMP
REFRIG	ERATION EQUIPMENT	SURVEY OBSE	RVATIONS	
CHW PUMP	CHILLER/COMPRESSOR NO.		MECH. ROOM	LOCATION (RM)

			UNIT TY	PE:	
CENTRIFUGAL W	ITH WATER SIDE CO	OOLING TOW	/ER	OTHER	
RECIPROCATING	WITH WATER SIDE	COOLING TO	OWER	AHU'S SERVED	
RECIPROCATING	WITH AIR COOLED	CONDENSIN	G UNIT		
ABSORBTION WIT	TH WATER SIDE CO	OLING TOWE	R		
AIR COOLED CON	DENSING UNIT				
CHW	DX	x	OTHER	CHW PUMP ONLY	

					NAM	EPLATE:				714 VIII.
CHILLER		MFG.				MODEL		***************************************	****	SERIAL NO.
	VOLTS		AMPS		PH		HZ		CAPACIT	(TONS)
TOWER		MFG.				MODEL				# OF FANS
	VOLTS		AMPS		PH		HZ		НР	
CW PUMP	HOWELL	MFG.	2247AD3			MODEL				SERIAL NO.
208	VOLTS	13	AMPS	3	PH	60	HZ	5	НР	
CNW PUM	Р	MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ	T	НР	
COMMENT	S:					1			1	

				C	PERATI	ON:					
HOURS OF	V:		s	М	т	w	т	F	s	COMMENT	
PRESENT STA	ART TIME		0	0	0	0	0	0	0	TIMECLOCK?	***************************************
PRESENT STO	OP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED ST	TART TIME										
REQUIRED ST	TOP TIME										
MONTHS (ON:				······································	<u></u>				L	
J	F	М	Α	М	J	J	Α	s	0	N	D
0	0	0	0	1	1	1	1	1	0	0	<u> </u>

			CONTROL	<u>5:</u>		
	PNEUMATIC	х	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	CWS (oF)		CWR (oF)	CNWS (oF)	CNWR (oF)	NONE
PANEL INDICATORS						
- PRESSURE	LITE-HI		LITE-LOW	GAUGES		
- TEMPERATURE	LITE-HI		LITE-LOW	GAUGES		
- OTHER						
COMMENTS:						

ANNUAL ENERGY SAVINGS SUMMARY FOR ADMINISTRATION BUILDINGS - BLDGS 638, 743, & 832

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)		(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
638	56.89	51.64	5.26	18.20	18.20	0.00	358.89	325.76	33.13

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
1			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 638	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
743	3,700	3,700	1.000	5.26	5.26	0.00	0.00	33.13	33.13
832	3,700	3,700	1.000	5.26	5.26	0.00	0.00	33.13	33.13

^{*}Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

		***	Annual	Baseline	ECO 2 -	Peak			Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	1	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
638	56.89	51.33	5.56	18.20	18.20	0.00	358.89	324.08	34.81

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 638	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
743	3,700	3,700	1.000	5.56	5.56	0.00	0.00	34.81	34.81
832	3,700	3,700	1.000	5.56	5.56	0.00	0.00	34.81	34.81

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR ADMINISTRATION BUILDINGS - BLDGS 638, 743, & 832

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
638	\$21,565

SIMILAR BUILDINGS

			Square		
<u> </u>			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 638	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)*	Cost (\$)*
743	3,700	3,700	1.000	\$21,565	\$21,565
832	3,700	3,700	1.000	\$21,565	\$21,565

^{*}Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
638	\$21,836

SIMILAR BUILDINGS

			Square		
	:		Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 638	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
743	3,700	3,700	1.000	\$21,836	\$21,836
832	3,700	3,700	1.000	\$21,836	\$21,836

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

			EIVER	IGT CONSERV	ATION INVESTIMEN	I PROGRAM (ECIP)	ı	
		LOCATION:	Fort Leonard	d Wood	REGION: 2 (Missou	ıri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Ener	gy Study, Insi	ulate Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
,	. IN\	VESTMENT:	RI DG 638 -	INSTALL 3 5"	FIBERGLASS BATT	INSULATION ON V	VALLE	
		CONSTRUCTION COS		=	FIDERGLASS BATT	INSOLATION ON V	\$19,084	
l		SIOH COST		.0% of 1A) =			\$1,336	
		DESIGN COST		.0% of 1A) =			\$1,145	
		TOTAL COST	•	+1B +1C) =			\$21,565	
	Ε.	SALVAGE VALUE OF	• • •	· · - · · • •			\$21,505 \$0	
		PUBLIC UTILITY COM					\$O \$O	
		TOTAL INVESTMENT		1D -1E -1F) =			>	\$21,565
^{2.}		ERGY SAVINGS (+) OR						
	DA	TE OF NISTIR 85-3273				JAN '96		
		ENERGY	FUEL COST	SAVINGS		DISCOUNT	DISCOUNTED	
		SOURCE		MBTU/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5)	
		ELECT.	\$7.33	5.26	\$39	13.80	\$532	
		DIST	\$0.00	0	\$ O	0.00	\$0	
		NAT GAS	\$5.30	33.13	\$176	17.76	\$3,118	
		COAL	\$0.00	0	\$0	0.00	\$0	
		ELEC. DEMAND			\$ O	13.47	\$0	
	F.	TOTAL		38.39	\$214		>	\$3,650
3.	NOI	N-ENERGY SAVINGS (4	-) OR COST (-	.)				
		ANNUAL RECURRING						
		1 ANNUAL MAINTEN	• • •		\$ O		\$ 0	
		2			\$O		\$0	
		3			\$O		\$0	
		4 TOTAL ANNUAL DI	SC. SAVINGS	(+)/COST	\$0		\$0	
	В.	NON-RECURRING (+/-						
		ITEM		SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
			•	COST(-) (1)	OCCURRENCE (2)		SAVINGS/COST (4)	
		- 04051 ME 50100 0				(TABLE A-2)		
		a. BASELINE EQUIP. RE	PLCMNT.				\$0	:
		b.					\$0	
		c.					\$0	
		d.					\$0	i
		e.					\$0	ļ
	_	f. TOTAL	DID 0 5 · · · · · · · ·	\$0			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+	OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	ST YEAR DOLLAR SAVI	NGS (+) / CO	STS (-)	(2	!F3 + 3A4 + (3Bf1/E	conomic Life))	\$214
5.	SIM	PLE PAYBACK (SPB) IN	YEARS (MUS	ST BE < 10 YE	ARS TO QUALIFY)	(1G/4) =		100.72
6.	тот	AL NET DISCOUNTED	SAVINGS			(2F5 + 3C) =		\$3,650
7.	DISC	COUNTED SAVINGS-TO	-INVESTMEN	T RATIO (SIR)		(6/1G) =		0.17
		(MUST HAVE SIR > 1	.25 TO QUAL	IFY)				

ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	-	n O	
PROJECT	<u> </u>	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Wo	OM,bo			DATE PREPARED	PARED	Ι,	18-Feb-96
ENGINEER		E M C Engineers, Inc.					ESTIMATOR	JR		D. Sinz
		Denver, CO					CHECKED BY) BY	A.A	A. Niemeyer
	Hom Dofor	:		MA	MATERIAL COST	3T		ABOR COS		
No.	Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/	Total	TOT A
-		BUILDING 638					MOING	5	-019	1018
2		INSTALL 3.5" BATT INSULATION ON WALLS								
ω 4										
2	13-1/21	INSTALL 3-1/2" BATT INSULATION	Ω.	2283.0	¢0.40	6444	0.40	1000	00,0	
ဖ	O	INSTALL 1/2" DRYWALL - TAPED & SANDED	S T	2207.0	\$0.70	\$4 14 \$440	2 CARP	0.007	\$420	\$834
7	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	2041.0	\$0.24	\$481	F-2	0.00	\$1,07	\$2,414
80	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	2283.0	\$0.07	\$152	1-PORD	0.01	\$551	\$70A
6 (R4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	EA.	3.0	\$18.39	\$55	9-0	4.48	\$1.176	\$1 231
2 5	KELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	1.0	\$8.82	\$3	1-ELEC	0.844	\$26	\$35
- 5	Z L	RELOCATE ELECTRICAL OUTLET	EA.	7.0	\$7.97	\$56	1-ELEC	0.896	\$191	\$247
13	2 - <u>-</u>	RELUCATE TOILET STALL	EA.	0.7	\$0.00	\$0	2-CARP	3.536	\$186	\$186
2 2		RELUCATE URINAL	EA	0.	\$77.75	\$78	Ģ	13.487	\$760	\$838
ָּרְ בּ	PWT	DELOCATE WALL CABINE!	 E	3.0	\$0.00	S S	1-CARP	1.7	\$134	\$134
<u> </u>	PAT	DELOCATE VALER CLOSE!	EA.	1.0	\$35.83	\$36	Q-2	10.904	\$956	\$991
12	1/N 1/2	INSTALL 40" MATERIA DE TANER O CONTROLL		312.0	\$1.14	\$357	1-CARP	0.134	\$1,098	\$1,456
2	101	INSTALL 1/2 WALENFAF BRU - LAPEU & SANDE	S.T.	76.0	\$0.84	\$64	2-CARP	0.02	\$80	\$144
0	202	DELOCATE DEVDEDIES WINDOW STATE	J. T.	76.0	\$1.83	\$139	2-TILE	0.084	\$309	\$448
20	5	MELCON I L DIVAT ENIES, WINDOW SHADES	Ä.	21.0	\$0.00	20	L-2	0.744	\$725	\$725
21						7,111				
22										
23										
24										
26										
27		SUBTOTAL				\$2 283			40 504	644.077
28	DIFF	DIFFICULTLY FACTOR			707	\$4,400			480,84	7/8/11¢
29					0.20	42 202			\$480	\$480
30	ĕ.	OVERHEAD	:		470/	62,203			\$10,074	\$12,357
31		SUBTOTAL		1	0/ /-	\$200 \$7.674			\$1,713	\$2,101
35	PRO	PROFIT			,007	1/0/70			\$11,787	\$14,458
33	!	SUBTOTAL		:	%0L	\$267			\$1,179	\$1,446
34	CONT	CONTINGENCY			200	\$2,938 \$100			\$12,965	\$15,904
	-8	TS.			%0% -	4288 4288			\$2,593	\$3,181
						93,320			\$15,559	\$19,084

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) eonard Wood REGION: 2 (Missouri)

		LOCATION:	Fort Leonard	d Wood	REGION: 2 (Missou	ıri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Ener	gy Study, Ins	ulate Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	. IN	/ESTMENT:	BLDG 638 -	INSTALL 1.5"	' RIGID INSULATION	I ON WALLS		
		CONSTRUCTION COS	т	=			\$19,324	
	В.	SIOH COST	(7	.0% of 1A) =			\$1,353	
	C.	DESIGN COST	(6	.0% of 1A) =			\$1,159	
	D.	TOTAL COST	(1A	+1B +1C) =			\$21,836	
	E.	SALVAGE VALUE OF	EXISTING EQ	UIPMENT =			\$0	
	F.	PUBLIC UTILITY COM	PANY REBAT	E =			\$0	
	G.	TOTAL INVESTMENT	(1	1D -1E -1F) =			>	\$21,836
2.	EN	ERGY SAVINGS (+) OR	COST (-)					
ľ		TE OF NISTIR 85-3273-		R DISCOUNT	FACTORS:	JAN '96		
		ENERGY	FUEL COST	SAVINGS		DISCOUNT	DISCOUNTED	
		SOURCE		MBTU/YR (2)		FACTOR (4)	SAVINGS (5)	
	Α.	ELECT.	\$7.33	5.56	\$41	13.80	\$562	
		DIST	\$0.00	0.00	\$0	13.00	\$0	
		NAT GAS	\$5.30	34.81	\$184	17.76	\$3,277	
	D.	COAL	\$0.00	0	\$0	17.70	\$0	
	E.	ELEC. DEMAND			\$0	13.47	\$0	
	F.			40.37	\$225	13.47	>	\$3,839
3.		N-ENERGY SAVINGS (+ ANNUAL RECURRING)				
		1 ANNUAL MAINTEN	ANCE		\$O	14.88	\$0	
		2			\$0	14.88	\$0	
		3			\$ 0	14.88	\$0	
		4 TOTAL ANNUAL DIS	SC. SAVINGS	(+)/COST	\$0		\$0	
	В.	NON-RECURRING (+/-)	•					
		ITEM		SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
			(COST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)	
						(TABLE A-2)		į
		a. BASELINE EQUIP. RE	PLCMNT.				\$O	
		b.					\$0	
		c.					\$0	
		d.					\$0	
		e.					\$ 0	
		f. TOTAL		\$ O			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+	OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	ST YEAR DOLLAR SAVIN	NGS (+) / CO	STS (-)	(2	2F3 + 3A4 + (3Bf1/E	conomic Life))	\$225
5.	SIM	PLE PAYBACK (SPB) IN	YEARS (MUS	T BE < 10 YE				96.95
6.	тот	AL NET DISCOUNTED S	AVINGS		·	(2F5 + 3C) =		\$3,839
7.	DIS	COUNTED SAVINGS-TO	INVESTMENT	Γ RATIO (SIR)		(6/1G) =		0.18
		(MUST HAVE SIR > 1.	25 TO QUALI	FY)				

Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO AATE FRIMA	ENGINE	ER'S OF	ENGINEER'S OPINION OF PROBABLE COST					SHEET	-	P	
EMAC Engineers, Inc. EMERINAL COST CHECKEE	PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Le	eonard Woo	d, MO			DATE PREPARED	PARED	18-	18-Feb-96
Item Refer	ENGINEER	~	E M C Engineers, Inc.					ESTIMATOR	JR	0	Sinz
Item Refer			Denver, CO					СНЕСКЕВ ВУ	ВҮ	A.	Niemeyer
Interpreted		14 C		:	MA	TERIAL CO	ST	1	LABOR COS		
BUILDING 638 INSTALL 14"FRIGID INSULATION S.F. 2283.0 \$0.59 \$1,350		Item Kerer Code	Item Description	Unit of Measure	Ouantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
11-1/2R INSTALL 1-15" RIGID INSULATION S.F. 2283.0 \$0.59 \$1,350 \$1,350 \$2,11 \$1,00 \$1,00 \$1,00 \$2,11 \$1,00 \$1,00 \$1,00 \$2,11 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00 \$1,00	-		BUILDING 638		,			311	1	בלמ	2 2
11-1/2RI INSTALL 1-1/2" RIGID INSULATION S.F. 2283.0 \$0.59 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.3	2		INSTALL 1.5" RIGID INSULATION		!						
III INSTALL 1-1/2" RIGID INSULATION S.F. 2283.0 \$0.59 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350 \$1.350	ო										
International Internationa	4										
ID INSTALL 1/2" DRYWALL - TAPED & SANDED S.F. 2207.0 \$4.22 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1.05 1	2	11-1/2RI		S.F.	2283.0	\$0.59	\$1,350	1-CARP	0.008	\$480	\$1,830
IFS INSTALL 34*X** FURRING STRIPS	9	ا ۵	S	S.F.	2207.0	\$0.20	\$442	2-CARP	0.017	\$1,971	\$2,414
TICP INSTALL TWO COATS OF PAINT ON DRYWALL S.F. 2283.0 \$0.07 \$152	1	FS	INSTALL 3/4"x2" FURRING STRIPS	F.	1106.0	\$0.19	\$211	1-CARP	0.016	\$465	\$676
R4WMMH RELOCATE 4-0" BASEBOARD RADIATION	∞ (ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	2283.0	\$0.07	\$152	1-PORD	0.01	\$551	\$704
RELS RELOCATE ELECTRICAL LIGHT SWITCH EA. 10 \$8.82 \$8.95 REOCATE ELECTRICAL LIGHT SWITCH EA. 7.0 \$7.37 \$8.56 RTS	ກ່	K4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	Ä.	3.0	\$18.39	\$55	Q-6	4.48	\$1,176	\$1,231
REO RELOCATE ELECTRICAL OUTLET EA. 70 \$7.97 \$56	10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	Ë	1.0	\$8.82	\$3	1-ELEC	0.844	\$26	\$35
RIS RELOCATE TOILET STALL EA 1.0 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.00 \$0.		REO	RELOCATE ELECTRICAL OUTLET	EA.	7.0	\$7.97	\$56	1-ELEC	0.896	\$191	\$247
RELOCATE URINAL	17.	RTS	RELOCATE TOILET STALL	EA.	1.0	\$0.00	Q\$	2-CARP	3.536	\$186	\$186
RWC RELOCATE WALL CABINET	13	2	RELOCATE URINAL	Ē	1.0	\$77.75	\$78	<u>Ģ</u>	13.487	\$760	\$838
RATT RELOCATE WATER CLOSET EA, 10 \$35.83 \$36 RATT RELOCATE CEILING TILE - 4-0" FROM WALL L.F. 312.0 \$1.14 \$357 IWB-1/2 INSTALL 1/2" WATERPRE BRD - TAPED & SANDE S.F. 76.0 \$0.84 \$564 ICT INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE S.F. 76.0 \$0.00 \$50 RELOCATE DRAPERIES, WINDOW SHADES EA, 21.0 \$0.00 \$50 RELOCATE DRAPERIES, WINDOW SHADES EA, 21.0 \$0.00 \$50 SUBTOTAL ONE SUBTOTAL 17% \$3.451 SUBTOTAL COST SUBTOTAL 10% \$3.455 CONT CONTINGENCY 20% \$5.759 TOTAL COST TOTAL COST 10% \$4.555 CONT CONTINGENCY 10% \$4.555 CONT CONTINGENCY 10% \$4.555 CONT CONTINGENCY 10% \$4.555 CONT CONTINGENCY 10% \$4.555 CONTINGENCY 20% \$4.555	4	RWC	RELOCATE WALL CABINET	EA.	3.0	\$0.00	\$0	1-CARP	1.7	\$134	\$134
MB-1/2 INSTALL 1/2" WATERPRE BRD - TAPED & SANDE S.F. 76.0 \$1.14 \$357 \$1.25 \$1.14 \$357 \$1.25 \$1.14 \$1.25 \$1.14 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.25 \$1.	15	RWTC	RELOCATE WATER CLOSET	EA.	1.0	\$35.83	\$36	Q-2	10.904	\$956	\$991
WB-1/2 INSTALL 1/2" WATERPRF BRD - TAPED & SANDE S.F 76.0 \$0.84 \$64 \$64	16	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	Ľ.	312.0	\$1.14	\$357	1-CARP	0.134	\$1,098	\$1,456
ICT INSTALL CERAMIC TILE, 4-14" x 4-14" TILE S.F. 76.0 \$1.83 \$139	17	WB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	76.0	\$0.84	\$64	2-CARP	0.02	\$80	\$144
RDR RELOCATE DRAPERIES, WINDOW SHADES EA. 21.0 \$0.00 \$0	198		INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	76.0	\$1.83	\$139	2-TILE	0.084	\$309	\$448
SUBTOTAL DIFF DIFFICULTLY FACTOR SUBTOTAL OH OVERHEAD SUBTOTAL PRO PROFIT PRO PROFIT CONT CONTINGENCY TOTAL COST	16		RELOCATE DRAPERIES, WINDOW SHADES	E	21.0	\$0.00	\$0	L-2	0.744	\$725	\$725
SUBTOTAL SUBTOTAL SUBTOTAL 5% SUBTOTAL 5% SUBTOTAL 17% SUBTOTAL 17% SUBTOTAL 10% SUBTOTAL 10% SUBTOTAL 10% SUBTOTAL CONT	25										
SUBTOTAL 5% DIFF DIFFICULTLY FACTOR SUBTOTAL 5% SUBTOTAL 17% PRO PROFIT CONT CONTINGENCY TOTAL COST	21										
SUBTOTAL 5% DIFF DIFFICULTLY FACTOR SUBTOTAL 5% OH OVERHEAD 17% PRO PROFIT 10% CONT CONT INGENCY 20% TOTAL COST 20%	22			1							
SUBTOTAL 5% DIFF DIFFICULTLY FACTOR 5% SUBTOTAL 17% OH OVERHEAD 17% PRO PROFIT 10% CONT CONTINGENCY 20% TOTAL COST 20%	23										
SUBTOTAL 5% DIFF DIFFICULTLY FACTOR 5% SUBTOTAL 17% OH OVERHEAD 17% SUBTOTAL 10% PRO PROFIT 10% CONT CONTINGENCY 20% TOTAL COST TOTAL COST 20%	25			1	4						
SUBTOTAL 5% DIFF DIFFICULTLY FACTOR 5% SUBTOTAL 17% PRO PROFIT 10% CONT CONTINGENCY 20% TOTAL COST 20%									THE RESERVE AND ADDRESS OF THE PERSON NAMED AND ADDRESS OF THE		
DIFF DIFFICULTLY FACTOR 5% SUBTOTAL 17% OH OVERHEAD 17% PRO PROFIT 10% CONT CONTINGENCY 20% TOTAL COST 20%	27		SUBTOTAL				\$2,950			\$9.107	\$12.057
SUBTOTAL OH OVERHEAD 17% \$ PRO PROFIT 10% \$ CONT CONTINGENCY \$ TOTAL COST \$ \$			DIFFICULTLY FACTOR		!	2%				\$455	\$455
OH OVERHEAD 17% \$ SUBTOTAL \$ \$ \$ PRO PROFIT \$ \$ CONT CONTINGENCY \$ TOTAL COST \$ \$	i		SUBTOTAL							\$9,562	\$12,512
SUBTOTAL PRO PROFIT SUBTOTAL CONT CONTINGENCY TOTAL COST			OVERHEAD			17%	\$501			\$1,626	\$2,127
PRO PROFIT SUBTOTAL CONT CONTINGENCY TOTAL COST		:	SUBTOTAL				\$3,451			\$11,188	\$14,639
SUBTOTAL CONT CONTINGENCY TOTAL COST		:	PROFIT			10%	\$345			\$1,119	\$1,464
CONT CONTINGENCY 20% TOTAL COST		:	SUBTOTAL		-		\$3,796			\$12,307	\$16,103
TOTAL COST			CONTINGENCY			20%	\$759			\$2,461	\$3,221
		TOTAL CO.	ST				\$4,555			\$14,768	\$19,324

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EMC	ENGINEERS, I	NC.					DATE:	Feb-96
PROJECT:	LIMITED ENERGY ST	UDY, INSULATE B	RICK BUIL	DINGS			BY:	DMS
CLIENT CO	NTRACT NO.: DACA	01-94D-0033					JOB:	1406.011
LOCATION:	FT LEONARD WOO	D, MO.					СНК:	NLA
ł							FILE:	638BHI
	BUILDII	NG HEATING I	LOAD C	ALCULA	TION SHEE	=т		
BLDG NO:	638	BLDG NAME:	ADMINIST			- •		
BLDG FUNC		ADMINISTRATIO		INATION				
FLOOR ARE		3,327				· · · · · · · · · · · · · · · · · · ·	# FLOORS	1
SLAB PERIN	METER: (FT)	278						
I. AREAS:	([] FIELD VERIFIED	ELEVATION PLANS	S)					
WALLS OF	000	100 FT	NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GR GLASS	055	(SQ. FT)	480 66	323 33	1,206 220	878 193	2,886	
PERSONNEL	DOOR	(SQ. FT)	0	25	39	28	512 91	
INSULATED		(SQ. FT)	0	0	0	0	0	
WALLS, NE		(SQ. FT)	414	266	947	657	2,284	
INSULATED	(OR CEILING AREA	(SQ. FT)		D) PERSONNI	LDOOR	(SQ. FT)	3,327	
BASEMENT		(SQ. FT)	0	0	0	(SQ. FT)	91	
	JCTION: ([] FIELD				· · · · · · · · · · · · · · · · · · ·	<u>_</u>	·	
	KETCH CROSS SECT			2011, 000		OMPONEN	TS	R-VALUE
					1.	OUTSIDE	AIR FILM	0.17
						4" FACE		0.43
						AIR SPAC 6" CMU	E	0.91 1.89
					5.	O CIVIO		1.09
					6.			
					7.	INSIDE A		0.68
						TOTAL	R-WALL = U=1/R	4.08 0.245
							0=1/N	0.245
ROOF: (SKE	TCH CROSS SECTIO	N OF ROOF)				OMPONEN		R-VALUE
						OUTSIDE		0.17
					1	BUILT UP STEEL DE		0.33
						AIR SPAC		1.00
					5.	6" BATT I	NSULATION	19.00
						ACOUSTI		1.35
					' '	INSIDE AI	R-ROOF =	0.68 22.53
							U = 1/R	0.044
CLACC TYPE	-	BDC IDENTILIEE	MI O I T	WID: 4 00				
GLASS TYPE		PPG 'PENNVERNO CONCRETE	JN C.L. IV	WNDV, SSA	4, .88 S.C.		R-GLASS SLF	1.61 0.83
BASEMENT		NONE					R-BASEM.	0.83
INSULATED		NONE					R-PANEL	0.00
	DOOR TYPE:	METAL					R-PDOOR	2.56
III. INFILTRA				2=				
	. H/M/L (SQ.FT.) H/M/L (SQ.FT.)		2886	X CFM /		0.000	=	0
	L H/M/L (SQ.FT.)		2000	X CFM /		0.092	=	266 0
	INGS / HR - SINGLE [DOOR	20		PENING /HR	1.600	=	32
DOOR OPEN	INGS / HR - DOUBLE	DOORS	25		PENING /HR	1.385	=	35
				TOTAL INF	LTRATION (CF	M)	=	332
ĺ	UA PANEL	PANEL AREA	0		X PANEL "U"	0.000	=	0
	UA PDOOR	PDOOR AREA	91		X DOOR "U"	0.391	=	36
	UA WALL UA ROOF	ROOF AREA	2,284 3,327		X WALL "U" X ROOF "U"	0.245	=	559
	UA GLASS	GLASS AREA	512		K GLASS "U"	0.621	=	148 318
	UA SLAB	SLAB PERIM.	278		X SLF	0.830	=	231
	UA BASEM.	B-WALL AREA	0		X BASE. "U"	0.000	=	0
l	INFILTRATION	CFM	332	1	X A. T. F.	1.035	=	344
				<u> </u>	OTAL UA (BTI	J/HR°F)		1,635

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

PREPARED BY CHECKED BY:

DMS AJN

FILE: BLDG: 638Z1 638

ZONE:

Ī -	Rates of Heat Gain from Occupants of Conditioned Spaces											
Zone No.		Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)					
1	10		Seated, light work, typing	Offices, hotels, apts	250	200	2,500	2,000				
TOTA	10					TOTAL	2,500	2,000				

	Peak Wattage Value for Lights										
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage						
1	19		Fluorescent, 2 - 40w lamps, 16w ballast (1x4 ft. fixture)	96	1,824						
	19		Incandescent - 75w	75	1,425						
l t	4	20	Incandescent - 100w	100	400						
	2		Incandescent - 200w ES	200	400						
	6		Incandescent - 150w	150	900						
TOTA	50			TOTAL	4,949						

	Peak Value for Internal Gains												
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)						
1	9		Microcomputer	350	91%		10,751						
<u> </u>	10		Printer (laser)	870	34%		29,693						
	1			1,570	20%	1,570	5,358						
	2		Microwave Oven	600	65%	1,200	4,096						
	1		Refrigerator/Freezer(Frostless 14 cu. ft.)	615	35%	615	2,099						
				TOTAL	47%	15,235	51,997						

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011

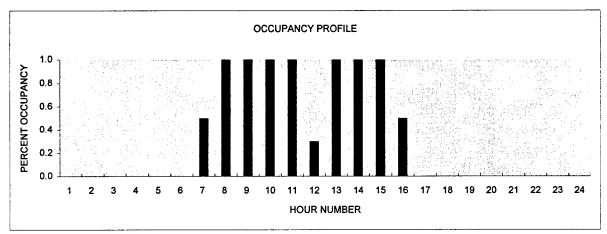
DATE: 26-Jan-96 PREPARED BY: DMS

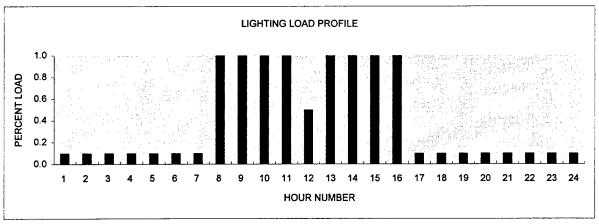
CHECKED BY: AJN
FILE: 638Z1
BLDG:

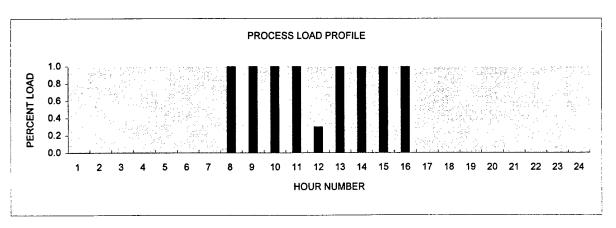
ZONE:

638

BLDG	BLDG	TYPE OF		HOUR NUMBER																						
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6	Gym	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	1.0	1.0	1.0	0.3	1.0	1.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	1.0	1.0	0.3	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0







```
BLDG 638 - ADMINISTRATION BASELINE
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                           1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 26616.000000
FLOOR AREA (SOFT) 3327.000000
HEATING COIL MAX HEATING RATE BTU/HR (OHMAX) 179380.000000
COOLING COIL MAX COOLING RATE BTU/HR (OCMAX) -168000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 33270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 332.000000
INFILTRATION PROFILE
      .600.600.600.6001.001.001.001.00.600.600.600.600.600
.600 .600 .600
                                                          .600 1.00
                                                          1.00
1.00
                                                                    1.00
                                                          .600
1.00
                                                                     .600
A FACTOR IN INFILTRATION EQUATION (CINA) 2.090000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 6654.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 309.000000
PARTITION UA BTU/HR-F (GUA) 130.000000
DOOR UA BTU/HR-F (DUA) 36.000000
WINDOW GLASS NUMBER (NG) 30
                            36.000000
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                         6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
```

WALL NUMBER 1 2 3 4 AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00 WALL AREA SQFT (AWLL) 265.8 657.0 414.0 947.0 WINDOW AREA SQFT (AWND) 33.0 192.5 66.0 220.0 WINDOW HEIGHT FT (WNDH) 5.5 5.5 5.5 WALL DATA 90.00 180.00 -90.00 WINDOW WIDTH FT (WNDW) 6.0 35.0 12.0 WIDTH OF OVERHANG (WOH) .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 40.0 .0

MAX SOLAR WITH NO SHADE (SOLMX)				
U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.245	.245	.245	.245
CN FACTORS	.01614	.01614	.01614	.01614
NUMBER OF BN FACTORS (NB	5	5		
BN FACTORS BN (BN)				
N=1	.00004	.00004	.00004	.00004
N=2			.00307	
N=3			.00918	
N=4	.00365	.00365	.00365	.00365
N=4 N=5 N=6	.00020	.00020	.00020	.00020
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=1 N=2 N=3 N=4	-1.52669	-1.52669	-1.52669	-1.52669
N=3	.64703	.64703	.64703	.64703
N=4	05586	05586	05586	05586
N=5	.00128	.00128	.00128	.00128
N=6	*****	*****	.64703 05586 .00128	*****
ROOT THEM DOTT (FROT) 332/	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)		96E-04		
ROOF B TRANSFER FUNCTIONS (BNR				
.000 .216E-05 .324E-04		.798E-04	.151E-04	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.97 1.36			250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.			000	
SKYLIGHT WIDTH FT (SKW) 0.0	0000000E+00			
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT			005.00	
SKYLIGHT GLASS NUMBER (NS)	1 (SKOH)	0.0000	005+00	
SKYLIGHT SHADING COEFFICIENT (0000005+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SI	HSK (MND N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)			-	_
DAYTIME SKY LIGHT U BTU/SOFT-H	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	אמים זגאמיםים ממים זגאמיםים	י (באף)	4 000000	E 01
	TEKNAL SPA	CE (FAP)	4.000000	E-01

------INTERNAL GAINS AND PROFILES ------

THERMOSTAT SET POINT DEG F

	KW -	-	BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	6007.	2500.	2000.		
HOUR	HO	OURLY FRACT	ION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.100	.000	.500	.500	70.0	76.0
8	1.000	1.000	1.000	1.000	70.0	76.0

```
    1.000
    1.000
    1.000
    1.000
    70.0
    76.0

    1.000
    1.000
    1.000
    1.000
    70.0
    76.0

    1.000
    1.000
    1.000
    1.000
    70.0
    76.0

    .500
    .300
    .300
    .300
    70.0
    76.0

    1.000
    1.000
    1.000
    70.0
    76.0

    1.000
    1.000
    1.000
    70.0
    76.0

  9
  10
  11
          12
  13
                                                        70.0
  14
                                                                     76.0
                                                                      76.0
  15
                                                                     76.0
  16
                                                                     76.0
  17
                                                                     76.0
  18
                                                                     76.0
  19
                                                                     76.0
  20
                                                                     76.0
  21
                                                                     76.0
  22
                                                                     76.0
  23
 24
                                                                      76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
                                                  65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 3720.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 258960.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 310852.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
.100
        .191 .200 .286 .300 .369
                                                                .400
                                                                           .451
.500
           .537
                      .600
                                .625
                                           .700
                                                      .718
                                                                .800
                                                                           .812
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 3
COOLING PLANT RATED OUTPUT BTU (CFLOT) 120000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 31168.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
      .000 .000
 .000
                                                                 .000
                                                                            .000
 .000
          .000
                     .000 .000
```

BLDG 638 - ADMINISTRATION BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	'n				
			SOLAR		DOOF	2			VENT	
			THRU		AND				AND	
	H LOAD		WINDOW				WALL			LATENT
JAN	.00		7.23		.00		.00			
	-44.21	LOSS		76	-12.59	.00	-12.08	-7.13	-30.46	.00
FEB	.08	GAIN	9.42	0.0	.00	0.0	.00	0.0	00	.05
		LOSS	,,,,		-10.78		-9.13			.00
									2010.	
MAR	1.91	GAIN	11.71		.00		.36			.33
	-27.13	LOSS		57	-10.07	.00	-7.22	-5.72	-25.49	.00
	9.40		12.34		.05		1.52			. 93
	-11.95	LOSS		32	-5.99	.00	-3.41	-3.40	-15.41	.00
MAY	20.11	GAIN	13.63	.02	.19	.00	3.14	.10	.36	3.35
	-3.72	LOSS		15	-3.32	.00	-1.11	-1.82	-9.58	.00
JUN		GAIN	13.51		.56		4.88	.31	1.10	11.37
	39	LOSS		05	-1.48	.00	20	81	-3.14	.00
.тгт.	48.73	GAIN	13.88	10	1.43	0.0	6.47	01	2 00	15.19
001		LOSS	13.00	03		.00			-2.07	.00
						.00	.03	.51	2.07	.00
AUG	43.96	GAIN	12.34	.09	1.08	.00	5.34	.60	2.09	14.31
	30	LOSS		03	-1.04	.00	13	57	-2.00	.00
SEP	26.12	GATN	10.52	U3	5.4	0.0	2.91	21	1 15	7 04
551		LOSS	10.32	14			-1.12			
					2.05		*	1.40	0.00	.00
OCT	7.45	GAIN	8.64	.00	.08	.00	.70	.04	.16	1.59
	-11.80	LOSS		35	-5.63	.00	-3.86	-3.12	-14.18	.00
***			4 55							
NOV	2.04	GAIN	6.77	.00	.00	.00	.11			.41
	-22.99	LOSS		51	-8.14	.00	-7.07	-4.52	-19.18	.00
DEC	.09	GAIN	6.24	.00	.00	.00	.00	.00	.00	.00
	-43.54	LOSS			-12.34		-12.21			.00
TOT			126.				25.			
	-204.	LOSS		-4.	-75.	0.	-58.	-42.	-184.	0.
MAX	HEATING	LOAD=	-1655	38. F	TUH ON	DEC 18	HOUR 7	ДМД	אשר דעשו	/ID _1
MAX	COOLING	LOAD=	1635	599. B	TUH ON	JUL 27	HOUR 15	AMB	IENT TEN	4P 92.
								/		

ZONE UA BTU/HR-F 1059.0

BEACON Energy Analysis By EMC Engineers, Inc. 638.I

BLDG 638 - ADMINISTRATION BASELINE

T.10000.11	. .								FAN T	COTAL
INTERN		RNAI.	SPACE		(COIN-	LIGHTING	DDOCESS	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND			
MONTH							KWH	BTU	BTU	BTU
JAN	70.	77.		5		64.	2.35	3.47	1.61	11.58
			68.	27	6	4.				
FEB	71.	78.		26		59.	2.09	3.09	1.46	10.35
			68.	2	6	14.				
MAR	71.	79.		9		64.	2.31	3.42	1.61	11.44
			68.	4	6	15.				
APR	73.	79.		16	11	63.	2.23	3.29	1.56	11.03
			69.	9	5	30.				
MAY	75.	81.		11	13	63.	2.35	3.47	1.61	11.58
			69.	11	5	39.				
JUN	76.	79.		12	14	85.	2.23	3.29	1.56	11.03
			69.	10	5	66.				
JUL	77.	79.		26	13	93.	2.31	3.42	1.61	11.44
			70.	10	5	57.				
AUG	76.	79.		30	14	87.	2.35	3.47	1.61	11.58
			70.	25	6	51.				
SEP	75.	80.		28	13	63.	2.19	3.24	1.56	10.89
			69.	15	6	39.				
OCT	73.	79.		17	13	64.	2.35	3.47	1.61	11.58
			69.	28	5	31.				
NOV	71.	78.		8	13	77.	2.26	3.34	1.56	11.17
			69.	3	7	18.				
DEC	70.	77.		12	14	61.	2.28	3.37	1.61	11.30
			68.	18	7	-1.	•			
YEAR							27.29	40.31	18.99	134.98

BLDG 638 - ADMINISTRATION BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

_						
		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	COOLING	HEATING	COOLING
JAN	669	33	0	0	1565E+06	.0000
FEB	543	64	0	0	1292E+06	.4277E+05
MAR	516	124	0	0	1290E+06	.8590E+05
APR	318	257	0	0	8244E+05	.1001E+06
MAY	194	372	0	0	5767E+05	.1211E+06
JUN	42	487	0	0	2035E+05	.1542E+06
JUL	19	603	0	0	1607E+05	.1636E+06
AUG	27	584	0	0	2766E+05	.1486E+06
SEP	150	404	0	0	5694E+05	.1561E+06
OCT	350	236	0	0	7872E+05	.1204E+06
NOV	504	108	0	0	1128E+06	.8818E+05
DEC	675	20	0	0	1655E+06	.3514E+05
YEAR	4007	3292	0	0	1655E+06	.1636E+06

BEACON Energy Analysis By EMC Engineers, Inc. 638.I

SYSTEM TOTALS

		ENERG	Y CONSUMPT	ION	TOTAL INTERNAL MAXIMUM					
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC			
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND			
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW			
JAN	69.32	.00	2.35	3.47	.47	11.58	9.1			
FEB	54.08	.01	2.09	3.09	.43	10.35	13.4			
MAR	46.79	.18	2.31	3.42	.47	11.44	16.3			
APR	24.43	.85	2.23	3.29	.46	11.03	17.1			
MAY	12.24	1.74	2.35	3.47	.47	11.58	18.2			
JUN	2.49	3.09	2.23	3.29	.46	11.03	18.2			
JUL	1.13	4.02	2.31	3.42	.47	11.44	18.2			
AUG	1.60	3.69	2.35	3.47	.47	11.58	18.2			
SEP	9.84	2.21	2.19	3.24	.46	10.89	18.2			
OCT	25.40	.67	2.35	3.47	.47	11.58	18.2			
NOV	42.44	.20	2.26	3.34	.46	11.17	16.4			
DEC	69.14	.01	2.28	3.37	.47	11.30	9.4			
YEAR	358.89	16.67	27.29	40.31	5.56	134.98	18.2			

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 170793. BTU/(SQFT-YEAR)

BLDG 638 - ADMINISTRATION BASELINE

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.								
		HORIZ.						S WHEN	MAXIMUM	MUMIXAM
	SURF. BTU/	SURF. BTU/		AVG. AMBT.	MAX SYS			M LOADS MET	COOLING LOAD	HEATING LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.		COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	1565E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.4277E+05	1292E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.8590E+05	1290E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1001E+06	8244E+05
MAY	2566.	1826.	1.000	65.	0.	0.	3	0	.1200E+06	5767E+05
JUN	2647.	1993.	1.000	72.	27.	0.	128	0	.1200E+06	2035E+05
JUL	2546.	2015.	1.000	77.	35.	0.	209	0	.1200E+06	1607E+05
AUG	2280.	1840.	1.000	76.	22.	0.	148	0	.1200E+06	2766E+05
SEP	1856.	1371.	1.000	68.	23.	0.	84	0	.1200E+06	5694E+05
OCT	1437.	953.	1.000	57.	0.	0.	1	0	.1200E+06	7872E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.8818E+05	1128E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.3514E+05	1655E+06

```
BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                  1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                      70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 26616.000000
FLOOR AREA (SQFT) 3327.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 179380.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -168000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 33270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 332.000000
INFILTRATION PROFILE
                                                         .600 .600 1.00
1.00 1.00 1.00
.600 .600 .600

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    1.00

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    .600

A FACTOR IN INFILTRATION EQUATION (CINA) 2.090000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 6654.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 309.000000
PARTITION UA BTU/HR-F (GUA) 130.000000
DOOR UA BTU/HR-F (DUA) 36.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
WALL NUMBER 1 2 3 4
AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00
WALL AREA SQFT (AWLL) 265.8 657.0 414.0 947.0
WINDOW AREA SQFT (AWND) 33.0 192.5 66.0 220.0
WINDOW HEIGHT FT (WNDH) 5.5 5.5 5.5
WINDOW WIDTH FT (WNDW) 6.0 35.0 12.0 40.0
WIDTH OF OVERHANG (WOH) .0 .0 .0 .0
OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0
                                      WALL DATA
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.064	.064	.064	.064
CN FACTORS	.00176	.00176	.00176	.00176
CN FACTORS NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)		•	J	J
N=1	00000	00000	00000	00000
N=2	00016	00016	.00000 .00016	00016
N=3	00016	00016	.00086	00086
N=5	00000	00000	.00066 .00008 *****	00008
N=6	******	******	******	******
NUMBER OF DN FACTORS (ND)				
N=1	1 00000	1 00000	1 00000	1 00000
N=2	-1 71064	-1 71064	1.00000 -1.71064	-1 71064
N=4	- 16643	- 16643	.89735 16643	- 16643
N=5	00728	00728	.00728	00728
N=6			00002	
ROOF AREA SQFT (AROF) 3327		00002	00002	00002
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y	FS 0-NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)			-	
ROOF B TRANSFER FUNCTIONS (BNR		J0B 04		
.000 .216E-05 .324E-04		.798E-04	.151E-04	
ROOF D TRANSFER FUNCTIONS (DNR		7.702 01		
1.00 -1.97 1.36		.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	0000	
SKYLIGHT HEIGHT FT (SKH) 0.				
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SK	O.0	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	000E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT ((SHSK) 0	.00000E+0	00	
SKYLIGHT SHADING COEFFICIENT (SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR S	SHSK (MST	,NDST)	1	1
SUMMER END MONTH AND DAY FOR S	SHSK (MND, N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)				
DAYTIME SKY LIGHT U BTU/SQFT-H	IR-F (SKYU)	1	.292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	ITERNAL SPA	CE (FAP)	4.000000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					I OIMI D	10 1
	KW -	-	BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	6007.	2500.	2000.		
HOUR	HO	OURLY FRACT	ION OF PEA	4K		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.100	.000	.500	.500	70.0	76.0
8	1.000	1.000	1.000	1.000	70.0	76.0

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1.000 1.000 1.000 1.000
                                                70.0
                                                           76.0
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                                                           76.0
  14
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  15
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                                                           76.0
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  16
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 23
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 24
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                                                 70.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                          65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 3720.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START 1....

SYSTEM SUPPLY AIR STOP TIME HR 24.00000

TEMP(TMXAIR) 55.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
                               24.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN)
                    5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 258960.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 310852.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                      .400
      .191 .200 .286 .300 .369
                                                               .451
                  .600
.500
         .537
                           .625
                                    .700
                                             .718
                                                      .800
                                                               .812
.900
         .906
                 1.00
                           1.00
CHILLER TYPE (ITYPCH)
                            3
COOLING PLANT RATED OUTPUT BTU (CFLOT) 120000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 31168.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
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 .000
      .000 .000
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BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

	PARTITN									
			SOLAR		DOOF	}			VENT	
			THRU		AND				AND	
	H LOAD		WINDOW				WALL			LATENT
JAN	.00		7.23		.00		.00	.00	.00	.00
	-35.96	LOSS		77	-12.67	.00	-3.14	-7.18	-31.01	.00
משש	0.0	CA TAT	0 40	0.0		• • •				
	.09 -27.97		9.42				.00			.05
	-21.31	TO22		64	-10.86	.00	-2.41	-6.17	-27.62	.00
MAR	1.89	GAIN	11.71	.00	.00	.00	.02	.00	.00	.32
	-23.18	LOSS			-10.14		-1.82			.00
									20115	
APR	8.92	GAIN	12.34	.00	.05	.00	.24	.03	.11	.89
	-10.81	LOSS		32	-5.97		77			.00
MAY		GAIN	13.63		.19				.36	3.24
	-3.71	LOSS		14	-3.19	.00	13	-1.75	-9.45	.00
.TITAT	33.96	GAIN	13.51	0.0	.56	0.0				
OON	48	LOSS	13.51		-1.33	.00			1.11	10.44
	.40	1033		04	-1.33	.00	.00	/3	-2.70	.00
JUL	43.15	GAIN	13.88	.12	1.44	.00	1.68	. 81	2.90	14.02
	15	LOSS			86	.00		48		.00
AUG			12.34	.09	1.08	.00			2.10	12.87
	32	LOSS		03	98	.00	.00	53	-1.88	.00
e E D	23.82	GAIN	10.52	0.3	5 4	0.0		~ -		
SEF		LOSS	10.52		.54 -2.58				1.15	
	3.00	DODE		15	-2.50	.00	10	-1.45	-6.95	.00
OCT	7.30	GAIN	8.64	.00	.08	.00	.11	.04	.16	1.52
	-10.29	LOSS			-5.64		92			.00
NOV	2.16	GAIN	6.77	.00	.00	.00	.01	.00	.00	.43
	-18.93	LOSS		51	-8.22	.00	-1.83	-4.56	-20.04	.00
										•
	.12		6.24					.00		.00
	-35.21	LOSS		77	-12.44	.00	-3.21	-6.97	-29.24	.00
тот	179.	GAIN	126	Ω	4.	٥	c	2		- 1
101	-171.		120.	-4	-75	0.	6. -14.	-42	_100	51. 0.
	_/			.	, , .	٥.	-14.	- 42.	-100.	υ.
MAX	HEATING	LOAD=	-1384							
	COOLING								IENT TEM	

ZONE UA BTU/HR-F 645.7

BEACON Energy Analysis By EMC Engineers, Inc. 638FG.I

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

									FAN TO	TAL
INTERN	INTE		SPACE			COIN-			HEAT MILLION	HEAT GAIN MILLION
MONTH							KWH			
JAN	70.	78.	69.	4 27	13 6	64. 4.	2.35	3.47	1.61	11.58
FEB	71.	78.	69.			59. 14.	2.09	3.09	1.46	10.35
MAR	72.	80.		27 3		62. 15.	2.31	3.42	1.61	11.44
APR	73.	80.	69.	16 14	11 5	63. 30.	2.23	3.29	1.56	11.03
MAY	74.	82.	69.			63. 38.	2.35	3.47	1.61	11.58
JUN	76.	79.	70.	~ .		88. 66.	2.23	3.29	1.56	11.03
JUL	76.	79.	70.	3 10		85. 57.	2.31	3.42	1.61	11.44
AUG	76.	79.	70.	1 25		82. 51.	2.35	3.47	1.61	11.58
SEP	75.	81.	69.			62. 39.	2.19	3.24	1.56	10.89
OCT	73.	81.	69.		11 4	64. 30.	2.35	3.47	1.61	11.58
NOV	72.	79.	69.	7 3		64. 17.	2.26	3.34	1.56	11.17
DEC	70.	77.	69.			61. 0.	2.28	3.37	1.61	11.30

YEAR

27.29 40.31 18.99 134.98

BEACON Energy Analysis By EMC Engineers, Inc. 638FG.I

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHE	MUMIXAM V	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	639	43	0	0	1350E+06	.0000
FEB	515	87	0	0	1099E+06	.4541E+05
MAR	496	147	0	0	1110E+06	.8542E+05
APR	329	258	0	0	7031E+05	.9857E+05
MAY	232	330	0	0	4928E+05	.1198E+06
JUN	61	410	0	0	1837E+05	
JUL	28	539	0	0	1392E+05	.1447E+06
AUG	32	508	0	0		.1537E+06
SEP	158	361	0		2412E+05	.1436E+06
OCT	347	238		0	4820E+05	.1542E+06
NOV	475		0	0	6811E+05	.1173E+06
DEC		125	0	0	9461E+05	.8890E+05
	629	36	0	0	1385E+06	.4256E+05
YEAR	3941	3082	0	0	1385E+06	.1542E+06

SYSTEM TOTALS

	HEATING MILLION	ENERG COOLING THOUSAND	Y CONSUMPT LIGHTING THOUSAND	PROCESS MILLION	TO FANS THOUSAND	OTAL INTERNAI HEAT GAIN MILLION	MAXIMUM ELECTRIC DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	60.36	.00	2.35	3.47	.47	11.58	9.1
FEB	47.53	.01	2.09	3.09	.43	10.35	13.6
MAR	42.18	.18	2.31	3.42	.47	11.44	16.3
APR	23.83	.81	2.23	3.29	.46	11.03	17.0
MAY	14.28	1.64	2.35	3.47	.47	11.58	18.2
JUN	3.61	2.80	2.23	3.29	.46	11.03	18.2
JUL	1.66	3.56	2.31	3.42	.47	11.44	18.2
AUG	1.89	3.26	2.35	3.47	.47	11.58	18.2
SEP	9.95	2.00	2.19	3.24	.46	10.89	18.2
OCT	23.85	.65	2.35	3.47	.47	11.58	18.1
NOV	37.56	.21	2.26	3.34	.46	11.17	16.5
DEC	59.07	.01	2.28	3.37	.47	11.30	10.0
YEAR	325.76	15.13	27.29	40.31	5.56	134.98	18.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 159257. BTU/(SQFT-YEAR)

BLDG 638 - ADMINISTRATION - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

OTHER MONTHLY STATISTICS

	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG.	MAX SYS TEMP. D DEG.	TEM RIFT	HOUR. SYSTEI	ICS S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1350E+06
FEB	1464.	929.	1.000	37.	0.	Ο.	0	0	.4541E+05	1099E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.8542E+05	1110E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.9857E+05	7031E+05
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1198E+06	4928E+05
JUN	2647.	1993.	1.000	72.	20.	0.	98	0	.1200E+06	1837E+05
JUL	2546.	2015.	1.000	77.	26.	0.	171	0	.1200E+06	1392E+05
AUG	2280.	1840.	1.000	76.	17.	Ο.	124	0	.1200E+06	2412E+05
SEP	1856.	1371.	1.000	68.	17.	Ο.	70	0	.1200E+06	4820E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1173E+06	6811E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.8890E+05	9461E+05
DEC	883.	604.	1.000	35.	0.	0.	0	0	.4256E+05	1385E+06

WINDOW AREA SQFT (AWND)

WINDOW HEIGHT FT (WNDH)

WINDOW WIDTH FT (WNDW)

WIDTH OF OVERHANG (WOH)

OVERHANG HGT ABV WNDW(HOH)

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BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                               70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 26616.000000
FLOOR AREA (SQFT) 3327.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 179380.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -168000.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 33270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 332.000000
INFILTRATION PROFILE

    .600
    .600
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    .600
    .600

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A FACTOR IN INFILTRATION EQUATION (CINA) 2.090000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 6654.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 309.000000
PARTITION UA BTU/HR-F (GUA) 130.000000
DOOR UA BTU/HR-F (DUA) 36.000000
                            30
WINDOW GLASS NUMBER (NG)
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                  WALL DATA
                                  1 2
                                                    3
WALL NUMBER
                                            90.00 180.00 -90.00
                                   .00
AZIMUTH ANGLE (AZ)
                                265.8
33.0
                                           657.0 414.0 947.0
WALL AREA SQFT (AWLL)
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5.5

192.5

6.0 35.0 .0 .0

5.5

66.0

5.5

.0

.0

12.0

220.0

5.5

40.0

: 0

.0

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	120.0 .055	120.0 .055	120.0 .055	120.0 .055
CN FACTORS	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
DM FACTORS BM (BM)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00000 .00019 .00089 .00059 .00007	.00007
N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DM EXCHODE				
N=1 N=2 N=3 N=4 N=5 N=6	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 3327	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 4.40	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)		96E-04		
ROOF B TRANSFER FUNCTIONS (BNR	.)			
.000 .216E-05 .324E-04		.798E-04	.151E-04	
ROOF D TRANSFER FUNCTIONS (DNR	.)		0505 00	
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)			0000	
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	0000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00	1		
SKYLIGHT WIDTH FT (SKW) 0.0 SKYLIGHT OVERHANG WIDTH FT (SK		00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	י ביי (פערטין)	0.000	00E+00	
SKYLIGHT GLASS NUMBER (NS)		0.000	,002.00	
SKYLIGHT SHADING COEFFICIENT (SHSK) C	.000000E+0	00	
SUMMER START MONTH AND DAY FOR	SHSK (MST	NDST)	1	1
SUMMER END MONTH AND DAY FOR S	HSK (MND, N	IDND)	1	1
SKY LIGHT AREA SOFT (ASKY)	0.00000E+	-00		
DAVETME CVV I TOUT II RTII/SOFT-H	IR-F (SKYII)	1	.292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	(NUY)	1.292998	
FRACTION OF PROCESS HEAT TO IN	ITERNAL SPA	ACE (FAP)	4.000000)E-01

THERMOSTAT SET POINT DEG F - - - - - BTU/HR - - - - -PEOPLE PEOPLE HEATING COOLING LATENT LIGHTS PROCESS SENSIBLE 8. 6007. 2500. 2000. PEAK VAL - - - HOURLY FRACTION OF PEAK - - - -HOUR .000 70.0 76.0 .100 .000 .000 1 .000 .000 .000 76.0 70.0 .100 2 .000 .000 .000 70.0 76.0 .100 3 .000 .000 70.0 76.0 .100 .000 .000 .000 70.0 76.0 .100 .000 .000 70.0 76.0 .000 .100 6

.500

1.000

.100

1.000

7

.000

1.000

-----INTERNAL GAINS AND PROFILES -----

.500

1.000

70.0

70.0

76.0

76.0

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1.000 1.000
1.000 1.000
                                                 70.0
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          1.000
                 1.000
                  1.000
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                                                           76.0
  10
          1.000
                  1.000
 11
          1.000
                                                 70.0
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         1.000
 15
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                1.000
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 23
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           .100
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                                      .000
 24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                          65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 3720.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR
                               0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                               24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
                               55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN)
                    5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.000000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 258960.000000
HEATING PLANT RATED INPUT BTU (HFLIN)
                                   310852.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                          .369
                  .200
                        .286
                                 .300
                                                       .400
                                                                .451
 .100
         .191
                  .600
                            .625
                                     .700
                                                       .800
                                                                .812
 .500
          .537
                                              .718
 .900
         .906
                  1.00
                            1.00
CHILLER TYPE (ITYPCH)
                            3
COOLING PLANT RATED OUTPUT BTU (CFLOT)
                                    120000.000000
COOLING PLANT RATED INPUT BTU (CFLIN)
                                    31168.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
              .000
                                 .000
                                          .000
                                                       .000
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BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI'	rn				
			SOLAR		D001	R			VENT	
			THRU		AND				AND	
	I LOAD						WALL	WINDO	W INFL	LATENT
JAN	.00	GAIN	7.23	.00	.00	.00	.00	.00	.00	.00
	-35.56	LOSS		77	-12.68	.00	-2.71	-7.18	-31.04	.00
FEB	.09	GAIN	9.42	.00	.00	.00	.00	.00	.00	.05
	-27.69	LOSS		64	-10.86	.00	-2.07	-6.18	-27.68	.00
MAR	1.90	GAIN	11.71	.00	.00	.00	.02	.00	.00	.32
	-23.00	LOSS		57	-10.15	.00	-1.57	-5.76	-26.54	.00
APR	8.93	GAIN	12.34	.00	.05	.00	.22	.03	.11	.89
	-10.77	LOSS		32	-5.97	.00	.22 67	-3.40	-16.14	.00
MAY	18.80	GAIN	13.63	.03	.19				.36	
	-3.74	LOSS		14	-3.18	.00	12	-1.75	-9.44	.00
JUN	33.72	GAIN	13.51	.06	.56	.00	1.09	.31	1.11	10.31
	50	LOSS		04	-1.32	.00	.00	72	-2.67	.00
\mathtt{JUL}		GAIN	13.88				1.45			13.95
	16	LOSS		02	85	.00	.00	47	-1.91	.00
AUG			12.34	.09					2.10	12.77
	33	LOSS		03	97	.00	.00	53	-1.86	.00
SEP	23.61	CATN	10.52	0.3	.54	0.0	C 0	2.1		5.01
SEP		LOSS	10.52		-2.58		.60			
	-3.00	позз		13	-2.50	.00	16	-1.44	-6.95	.00
ОСТ	7.31	CATN	8.64	0.0	0.0	0.0	.10	0.4	1.0	1 50
	-10.23	LOSS	0.04		-5.64		80			1.52 .00
	10.25	1055		55	-3.04	.00	60	-3.13	-15.12	.00
NOV	2.18	CATN	6.77	0.0	0.0	00	.01	0.0	0.0	4.3
	-18.75		0.77		-8.23		-1.57			.43
	10.75	TODD		51	-0.23	.00	-1.57	-4.5/	-20.09	.00
DEC	.12	CATN	6 24	00	0.0	0.0	0.0	0.0	0.0	0.0
	-34.82				-12.45		.00 -2.76			.00
	-34.02	повв		,,	-12.45	.00	-2.76	-0.97	-29.20	.00
тот	178	GAIN	126.	٥	Δ	0	5.	2	Ω	50.
	-169.		120.	-4	-75	0.	-12.	-42	_189	0.
				••	, , .	٠.	±4.	42.	10 <i>9</i> .	٥.
MAX 1	HEATING	LOAD=	-1379	532. B	TUH ON	DEC 18	HOUR 7	AME	IENT TEN	1P -1
MAX	COOLING	LOAD=	1539	979. B	TUH ON	SEP 3	HOUR 11		IENT TEN	
	_			_						

ZONE UA BTU/HR-F 625.1

BEACON Energy Analysis By EMC Engineers, Inc. 638RGD.I

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

								FAN T	OTAL
INTERN.									
		RNAL			COIN-				HEAT GAIN
MONTH		PERAT MAX			CIDENT AMBT.	THOUSAND KWH	MILLION BTU		MILLION BTU
JAN	70.	78.	69.	4 27	64. 4.	2.35	3.47	1.61	11.58
FEB	71.	78.	69.	26 6	 59. 14.	2.09	3.09	1.46	10.35
MAR	72.	80.	69.		62. 15.	2.31	3.42	1.61	11.44
APR	73.	80.	69.		63. 30.	2.23	3.29	1.56	11.03
MAY	74.	82.	69.		63. 38.	2.35	3.47	1.61	11.58
JUN	76.	79.	70.		 88. 66.	2.23	3.29	1.56	11.03
JUL	76.	79.	70.	3 10	85. 57.	2.31	3.42	1.61	11.44
AUG	76.	79.	70.	1 25	82. 51.	2.35	3.47	1.61	11.58
SEP	75.	81.	69.	25 15	62. 39.	2.19	3.24	1.56	10.89
OCT	73.	81.	69.	12 28	64. 30.	2.35	3.47	1.61	11.58
NOV	72.	79.	69.	7 3	64. 17.	2.26	3.34	1.56	11.17
DEC	70.	78.	69.		61. 0.	2.28	3.37	1.61	11.30
YEAR						27.29	40.31	18.99	134.98

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	NAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	вт	J
MONTH	HEATING	ECONOMIZER	HEATING C	COOLING	HEATING	COOLING
JAN	638	44	0	0	1343E+06	.0000
FEB	511	89	0	0	1092E+06	.4588E+05
MAR	494	148	0	0	1104E+06	.8552E+05
APR	329	258	0	ō	6997E+05	.9850E+05
MAY	232	329	0	0	4921E+05	
JUN	64	404	0	0		.1196E+06
JUL	28	535	0		1859E+05	.1444E+06
AUG	33		-	0	1415E+05	.1535E+06
		504	0	0	2429E+05	.1434E+06
SEP	158	354	0	0	4804E+05	.1540E+06
OCT	347	239	0	0	6779E+05	.1173E+06
NOV	473	126	0	0	9398E+05	.8899E+05
DEC	627	37	0	0	1375E+06	
YEAR	3934	3067		_		.4302E+05
	2224	3007	0	0	1375E+06	.1540E+06

SYSTEM TOTALS

	HEATING	ENERG COOLING THOUSAND	Y CONSUMPT LIGHTING THOUSAND	TION PROCESS MILLION	TO FANS THOUSAND	OTAL INTERNAL HEAT GAIN MILLION	MAXIMUM ELECTRIC DEMAND
MONTH	MILLION BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	59.97	.00	2.35	3.47	.47	11.58	9.1
FEB	47.07	.01	2.09	3.09	.43	10.35	13.7
MAR	41.92	.18	2.31	3.42	.47	11.44	16.3
APR	23.78	.81	2.23	3.29	.46	11.03	17.0
MAY	14.28	1.63	2.35	3.47	.47	11.58	18.2
JUN	3.79	2.77	2.23	3.29	.46	11.03	18.2
JUL	1.66	3.54	2.31	3.42	.47	11.44	18.2
AUG	1.95	3.24	2.35	3.47	.47	11.58	18.2
SEP	9.94	1.98	2.19	3.24	.46	10.89	18.2
OCT	23.80	.65	2.35	3.47	.47	11.58	18.1
NOV	37.30	.21	2.26	3.34	.46	11.17	16.5
DEC	58.60	.01	2.28	3.37	.47	11.30	10.1
YEAR	324.08	15.04	27.29	40.31	5.56	134.98	18.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 158658. BTU/(SQFT-YEAR)

BLDG 638 - ADMINISTRATION - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.								
		HORIZ.					HOUR	S WHEN	MUMIXAM	MUMIXAM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	HEATING
	BTU/	BTU/	1	AMBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1343E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.4588E+05	1092E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.8552E+05	1104E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.9850E+05	6997E+05
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.1196E+06	4921E+05
JUN	2647.	1993.	1.000	72.	20.	Ο.	95	0	.1200E+06	1859E+05
JUL	2546.	2015.	1.000	77.	26.	0.	167	0	.1200E+06	1415E+05
AUG	2280.	1840.	1.000	76.	16.	0.	123	0	.1200E+06	2429E+05
SEP	1856.	1371.	1.000	68.	16.	0.	68	0	.1200E+06	4804E+05
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.1173E+06	6779E+05
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.8899E+05	9398E+05
DEC	883.	604.	1.000	35.	Ο.	Ο.	0	0	.4302E+05	1375E+06

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORM	ATION:					
Building No:	638	Building Na	me: Adminstration			
Surveyed by:	DMS	Date:	11/6/95	Building Use	: Administration	
Building Contact:				Phone No:		
Building Contact:				Phone No:		- V
OCCUPANCY:						
Number of Employee	es: Mon./F	Fri.: 10	Schedule	730	То	1630
	Tues./	Thurs 10		730	To	1630
	Wed.	10		730	То	1630
	Sat./Su	ın.			То	
Visitors Per Day:	Mon./F	ri.:	Schedule:		То	
	Tues./	Thurs.			То	
	Wed.				То	
	Sat./Su	ın.			То	
Comments:						
LIGHTING SCHEDU	LE:					
Normal Occupancy:	MonF	ri.:	Schedule:	730	То	1630
	Sat./Su	ın.:		730	То	1630
Cleaning Crew/2nd S	hift: MonF	ri.:	Schedule:		То	
-	Sat./Su	n.:			То	
EQUIPMENT SCHEE	OULE:					
an/AHU Schedule:	MonF	ri.:	Schedule:	0	То	2400
	Sat./Su	n.:		0	То	2400
Chiller Schedule:	MonFr	ri.:	Schedule:	0	То	2400
	Sat./Su	n.:		0	То	2400
Boiler Schedule:	MonFr	ri.:	Schedule:	0	То	2400
	Sat./Su	n.:		0	То	2400
Aux. Equipment Sche	dule:					
	MonFr	i.:	Schedule:	0	То	2400
	Sat./Su	n.:	7	0	То	2400
	MonFr	i.:	Schedule:		То	
	Sat./Sui	n.:			То	
Comments:		-	14		3.7-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	***

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 638 **Building Name: Administration**

BUILDING ENVELOPE

		EXTERIOR WALLS		LIST OF EXT. WALL CONSTRUCTION TYPES
Wall	Wall			
Direction (N,	Construction		Wall Construction	
E, W, or S)	No.	Comments	No.	Description
N	XW-4		XW-I	Face Brick & CMU
E	XW-4		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-4		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-4		XW-4	Face Brick, CMU, & Plaster Board
		WINDOWS		LIST OF WINDOW TYPES
Window	Window			
Direction (N, E, W, or S)	Construction No.	Comments	Window Construction No.	Description
N	W-1		W-I	Double Pane Clear
E	W-1		₩-2	Double Pane Tinted
S	W-1		W-3	Single Pane with Storm Windows
W	W-1		W-4	Single Pane
		General: Insulated metal panel on top		
		portion of windows		
		ROOF CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
	Roof	COOF CONSTRUCTION		LIST OF ROOF CONSTRUCTION TIFES
Roof	Construction		Roof Construction	
Location	No.	Comments	No.	Description
ALL	R-2		R-I	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
		GENERAL: Plaster ceiling in office areas; Acoustic ceiling tiles in waiting area and hallways only.	R-2	BUR, Metal Deck, Air Space, 6" Batt Insul., Ceiling Tile/Plaster
			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Clg.
			R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaster Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.

E M C No. 1406-011

Prepared by: DMS

Date: 2/18/96

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

638

Building Name: Administration

EMC No. 1406-011

Date: 2/18/96 Prepared by: DMS

Building No INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INT	RIOR EQUI	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
					Architectural
				A-I	Interior Partitions
N	E-2	3	Glazed structural block 5'-0" AFF Approximate	A-2	Wall Placards
N	A-4	10	area 25'x5'	A-3	Drapery Valances
				A-4	Drapery Rods, Venician Blinds
				A-5	Cabinets
Е	M-3	3			
Е	A-4	1			Plumbing
				P-I	Sinks
S	E-2		Glazed structural block 5'-0" AFF in latrine.	P-2	Commodes
S	E-3	1		P-3	Toilet Stalls
S	A-5	3		P-4	Water Fountains
S	P-2	1		P-5	Urinal
S	P-5 P-3	1			
S	P-3 A-4	1 7			HVAC Mechanical
-	- A-4	7		M-I	Floor Supply/Return Grilles
w	A-4			M-2	Ceiling Supply/Return Grilles
	A-4	3		M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Wall mounted convection type heater
				M-6	1/2" Hot & Cold Water Piping
				┨	Electrical
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Wall Mounted Television
					Lighting
				L-I	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					E. D. A.
				F-I	Fire Protection Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-2	Sprinkler Heads
				F-4	Fire Extinguishes
				1-4	Line extiliguistics
					Communication
				(-1	Telephones - Wall Mounted
1				(-2	Telephones - Booth Mounted
				(-3	Telephone Jacks

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG: 638 EMC NO.: 1406-011

DATE:

FILE:

Feb-96

PREPARED BY:

DMS AJN

CHECKED BY: 638AH1

	AIR HANDLING UNIT SURVEY	OBSERVATIONS	
AHU-1	AHU NO.	MECH. ROOM	LOCATION (RM)
DX-1	REF. SYS. SERVING AHU	ALL	SERVES AREA

			UNIT TYP	E:		
	SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	H&∨	
х	MULTIZONE	DOUBLE DT	REHEAT	INDUCTION	VAV	
3	NUMBER OF ZONE	S	OTHER		······································	
	COMMENT:				, <u></u>	

					NAMEPL	ATE:				
DUNHAM-	BUSH				MFG.		MZ-32-I			MODEL
3.0 SUPPLY FAN HP WESTINGHOUSE					MFG.	ABDP		MODEL		
	RET/EXH FAN HP				MFG.					MODEL
3720	CFM-HTG	3720	CFM-CLG	10%	MIN %OA	100%	MAX %OA	100%	% HTG A	REA SERVED

	COILS:												
х	NONE		STM	HW	ELEC		MOD VLV	PREHEAT					
	NONE	x	STM	нw	ELEC	×	MOD VLV	HEATING					
x	NONE		STM	HW	ELEC		MOD VLV	REHEAT					
х	NONE		STM	HW	ELEC		MOD VLV	HUMID.					
	NONE	х	DX	cw		×	MOD VLV	COOLING					

					OPERATI	ON:					
HOURS O	N:		s	м	Т	w	Т	F	s	COMMENTS	
PRESENT ST	ART TIME		500	500	500	500	500	500	500	TIMECLOCK?	*
PRESENT ST	OP TIME		1200	1700	1700	1700	1700	1700	1500	YES	
REQUIRED S	TART TIME										
REQUIRED S	TOP TIME										·
MONTHS	ON:		-	•					JJII .	·	
J	F	М	Α	М	J	J	Α	s	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

				CONTRO	LS:				
	x	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	х	SINGLE STPT		DUAL SETPNT		SETBACK			<u> </u>
SPACE SETPOINT (oF):	70	OCC HEAT		UNOCC HEAT	78	OCC COOL		UNOCC COOL	
OTHER SETPOINTS (oF):		HOT DECK		COLD DECK		MIXED AIR	1	OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Y	RA (Y/N)	Y	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Υ	YES		NO		·····			***************************************
COMMENTS:	CONTROL	S ARE IN GOOD	CONDITI	ON		L	<u> </u>		

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY:

AJN 638CH1

	BLDG:	638	FILE:	638CH1
REFR	IGERATION EQUIPMENT S	SURVEY OBSE	RVATIONS	
DX-1	CHILLER/COMPRESSOR NO.		OUTSIDE BLDG	CATION (RM)

				UNIT T	YPE:			
	CENTRIFUGA	AL WITH W	ATER SIDE COOL	ING TOWER		OTHER		
	RECIPROCA	TING WITH	WATER SIDE CO	OLING TOWER	x	AHU'S SERVED	AHU-1	(ZN1)
	RECIPROCAT	TING WITH	AIR COOLED CO	NDENSING UNIT				***************************************
	ABSORBTIO	WITH WA	TER SIDE COOLI	NG TOWER				
х	AIR COOLED	AIR COOLED CONDENSING UNIT						
	CHW	х	DX	OTHER	1			

	NAMEPLATE:									
CHILLER	WEBSTER	MFG.	A20A		MODEL	MODEL 51039			SERIAL NO.	
208	VOLTS	62	AMPS 3 PH		60	HZ 10		CAPACITY (TONS)		
CONDENS	ER FANS	MFG.				MODEL			1	# OF FANS
208	VOLTS	7.5	AMPS	3	РН	60	HZ	2	НР	
DTW PUM	Р	MFG.				MODEL			*	SERIAL NO.
	VOLTS		AMPS		PH		HZ		НР	
CNW PUM	Р	MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		НР	
COMMENT	S:									

				(OPERATI	ON:					
HOURS OF	١:		s	М	т	w	Т	F	S	COMMENT	
PRESENT STA	ART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STO	OP TIME		2400	2400	2400	2400	2400	2400	2400	NO TIMECLO	:K
REQUIRED ST	ART TIME										
REQUIRED ST	OP TIME										
MONTHS (ON:				L.					L	
J	F	м	Α	м	J	J	Α	s	0	N	В
0	0	0	0	1	1	1	1	1	0	0	

	PNEUMATIC	x	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	CWS (oF)		CWR (oF)	CNWS (oF)	CNWR (oF)	
PANEL INDICATORS						
- PRESSURE	LITE-HI		LITE-LOW	GAUGES	<u> </u>	
- TEMPERATURE	LITE-HI		LITE-LOW	GAUGES		
- OTHER						
COMMENTS: FM RAD	IO CONTROL					

ANNUAL ENERGY SAVINGS SUMMARY FOR GYMNASIUM's - BUILDINGS 826, 640, & 746

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
1	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
826	0.00	0.00	0.00	12.10	12.10	0.00	8464.22	8303.89	160.33

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
		Î	Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 826	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
640	20,425	20,425	1.000	0.00	0.00	0.00	0.00	160.33	160.33
746	20,425	20,425	1.000	0.00	0.00	0.00	0.00	160.33	160.33

^{*}Energy savings prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak			Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
1	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
826	0.00	0.00	0.00	12.10	12.10	0.00	8464.22	8297.25	166.97

SIMILAR BUILDINGS

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 826	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
640	20,425	20,425	1.000	0.00	0.00	0.00	0.00	166.97	166.97
746	20,425	20,425	1.000	0.00	0.00	0.00	0.00	166.97	166.97

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR GYMNASIUM's - BUILDINGS 826, 640, & 746

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
826	\$129,351

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 825	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
640	20,425	20,425	1.000	\$129,351	\$129,351
746	20,425	20,425	1.000	\$129,351	\$129,351

^{*}Investment Cost prorated on a square foot basis

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
826	\$139,097

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 826	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
640	20,425	20,425	1.000	\$139,097	\$139,097
746	20,425	20,425	1.000	\$139,097	\$139,097

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

DICATION: FOR Leonard Wood REGION: 2 (Missouri) PROJECT TIO: 1406-011									
ANALYSIS DATE: 02/18/96			LOCATION:	Fort Leonard W	ood	REGION: 2 (Missouri)	•	PROJECT NO:	1406-011
1. INVESTMENT: BLOG 826 - INSTALL 3.5" BATT INSULATION ON WALLS A. CONSTRUCTION COST = \$114.7470 B. SIGH COST (7.0% of 1A) = \$8.013 C. DESIGN COST (8.0% of 1A) = \$8.083 D. TOTAL COST (1A + 18 + 1.0) = \$129.351 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$00 F. PUBLIC UTILITY COMPANY REBATE = \$00 G. TOTAL INVESTMENT (1D - 1E - 1F) = \$129.351 Z. ENERGY SAVINGS (+) OR COST (+): DATE OF INSTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96 ENERGY FUEL COS SAVINGS ANNUAL * DISCOUNT DISCOUNTED SOURCE \$100 MBTU (11 MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (6) A. ELECT. \$7.33 0 \$0 \$0 \$13.80 \$00 B. DIST \$0.00 0 \$0 \$0.00 \$00 C. NAT GAS \$0.50 \$160.33 \$850 \$17.76 \$15.092 D. COAL \$0.00 0 \$0 \$0.00 \$00 E. ELEC. DEMAND \$0.00 0 \$0 \$0.00 \$00 E. ELEC. DEMAND \$0.00 0 \$0 \$0.00 \$00 F. TOTAL \$0 \$0.33 \$850 \$13.47 \$00 F. TOTAL \$0 \$0.00 \$0 \$0 B. NON-RECURRING (+/) 1 ANNUAL MAINTENANCE \$0 \$00 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$00 \$00 B. NON-RECURRING (+/-) ITEM SAVINGS (+) PEAR OF DISCOUNT DISCOUNTED COST(+) (17 ARLE A-2) B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(+) B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(+) B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(+) B. NON-RECURRING (+/-) ITEM SAVINGS (+) POR COST (-) (3A4 + 3B14) = \$00 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3B14) = \$00 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3B14) = \$00 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (12F3 + 3A4 + (3B11/Economic Life)) \$152.22 TO DISCOUNTED SAVINGS (+) / COSTS (-) 10 YEARS TO QUALIFY) (110/4) = \$152.22 TO DISCOUNTED SAVINGS (-) / COSTS (-) 10 YEARS TO QUALIFY) (110/4) = \$152.22 TO DISCOUNTED SAVINGS (-) / COSTS (-) 10 YEARS TO QUALIFY) (110/4) = \$152.22 TO DISCOUNTED SAVINGS (-) / COSTS (-) 10 YEARS TO QUALIFY) (110/4) = \$152.22 TO DISCOUNTED SAVINGS (-) / COSTS (-) 10 YEARS TO QUALIFY) (110/4) = \$152.22 TO DISCOUNTED SAVINGS (-) / COSTS (-) 10 YEARS TO QUALI			PROJECT TITLE:	Limited Energy	Study, Insi	ulate Brick Buildings		FISCAL YEAR:	1996
A. CONSTRUCTION COST = \$114.470 B. SICH COST (7.0% of 1A) = \$8.013 C. DESIGN COST (6.0% of 1A) = \$8.013 D. TOTAL COST (1A + 1B + 1C) = \$129,351 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 G. TOTAL INVESTMENT (1D - 1E - 1F) = \$0 DATE OF INSTIR 95-3273-10 USED FOR DISCOUNT FACTORS: LENERGY SAVINGS (+) OR COST (+): DATE OF INSTIR 95-3273-10 USED FOR DISCOUNT FACTORS: LENERGY FUEL COS SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$4.000			ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
A. CONSTRUCTION COST = \$114.470 B. SICH COST (7.0% of 1A) = \$8.013 C. DESIGN COST (6.0% of 1A) = \$8.013 D. TOTAL COST (1A + 1B + 1C) = \$129,351 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 G. TOTAL INVESTMENT (1D - 1E - 1F) = \$0 DATE OF INSTIR 95-3273-10 USED FOR DISCOUNT FACTORS: LENERGY SAVINGS (+) OR COST (+): DATE OF INSTIR 95-3273-10 USED FOR DISCOUNT FACTORS: LENERGY FUEL COS SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$4.000		18 P.	COTAMENT:	DI DO GOC INO	TALL 2 F"	PATT BIGUI ATION	ONI MATALLE		
B. SIGH COST (7.0% of 1A) = \$8,013 C. DESIGN COST (6.0% of 1A) = \$6,868 D. TOTAL COST (1A + 1B + 1C) = \$129,351 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 F. PUBLIC UTILITY COMPANY REBATE = \$0 G. TOTAL INVESTMENT (1D - 1E - 1F) = \$129,351 2. ENERGY SAVINGS (+) OR COST (+): DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN_98 ENERGY FUEL COS SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$1/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 0 \$0 13.80 \$0 E. DIST \$0.00 0 \$0 13.80 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 F. TOTAL \$0 0.00 \$0 13.47 \$0 F. TOTAL \$0 160.33 \$850 \$13.47 \$0 F. TOTAL \$0 13.47 \$0 F. TOTAL \$0 \$0 13.47 \$0 F. TOTAL \$0 \$0 \$0 F. TOTAL ANNUAL RECURRING (+/-) ITEM SAVINGS (+) / COST (-) A. ANNUAL RECURRING (+/-) ITEM SAVINGS (+) / COST \$0 \$0 F. TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 F. TOTAL \$0 \$0	٦٠.					BATT INSULATION	UN WALLS	\$114.470	
C. DESIGN COST (6.0% of 1A) =									
D. TOTAL COST (1A + 1B + 1C) = \$129,351 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 F. PUBLIC UTILITY COMPANY REBATE = \$0 G. TOTAL INVESTMENT (1D · 1E · 1F) = \$0 ENERGY SAVINGS (+) OR COST (-): DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN · 96 ENERGY FUEL COS SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$1/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 0 \$0 13.80 \$0 E. BLECT. \$7.33 0 \$0 13.80 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL \$0 0.00 \$0 13.47 \$0 F. TOTAL \$0 0.00 \$0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL \$0 0.00 \$0 A ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 3 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 COST (-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) COST (-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) C. COTAL \$0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0				·					
E. SALVAGE VALUE OF EXISTING EQUIPMENT =								•	
F. PUBLIC UTILITY COMPANY REBATE =				•	•			-	
G. TOTAL INVESTMENT (1D-1E-1F) =									
2. ENERGY SAVINGS (+) OR COST (+): DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: ENERGY FUEL COS SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 0 \$0 13.80 \$0 B. DIST \$0.00 0 \$0 0.00 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL \$0 160.33 \$850 \$0 13.47 \$0 F. TOTAL \$160.33 \$850 \$0 13.47 \$0 F. TOTAL \$160.33 \$850 \$0 13.47 \$0 F. TOTAL \$0 \$0.00 \$0 \$0 \$0 A. ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 3 A TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 B. NON-RECURRING (+/-) ITEM SAVINGS (+) OR COST (+) (7ABLE A-2) a. BASELINE EQUIP. REPLCMINT. \$0 c. \$0 d. \$0 c. \$0 c. TOTAL \$0 \$0 C. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$50 152.22 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-1) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22 5. DISCOUNTED SAVINGS (-1) COST (-2) (16/16) = \$152.22									¢120 251
DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: ENERGY FUEL COS SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 0 \$0 13.80 \$0 B. DIST \$0.00 0 \$0 0.00 \$0 0.00 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 0.00 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0 0.00 \$0		G.	TOTAL INVESTMENT	(10-	1E -1F/ =				V123,331
ENERGY FUEL COS SAVINGS ANNUAL \$ DISCOUNT DISCOUNTED SOURCE \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 0 \$0 13.80 \$0 B. DIST \$0.00 0 \$0 0.00 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL 160.33 \$850 \$0 13.47 \$0 F. TOTAL 160.33 \$850 \$0 13.47 \$0 F. TOTAL \$0 0.00 \$0 \$0 13.47 \$0 F. TOTAL \$0 0.00 \$0 \$0 \$0 B. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 \$0 3 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 B. NON-RECURRING (+/-) ITEM SAVINGS (+) VEAR OF DISCOUNT DISCOUNTED COST (-) COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) COST(-) (1) OCCURRENCE (2) \$0 B. BASELINE EQUIP. REPLCMNT. \$0 C	2.	ENE	RGY SAVINGS (+) OR	COST (-):					
SOURCE \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) A. ELECT. \$7.33 0 \$0 \$0 13.80 \$0 B. DIST \$0.00 0 \$0 0.00 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15,092 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0.00 0 \$0 13.47 \$0 F. TOTAL \$160.33 \$850 \$13.47 \$0 F. TOTAL \$160.33 \$850 \$13.47 \$0 F. TOTAL \$160.33 \$850 \$13.47 \$0 F. TOTAL \$0 OCOST (-) A. ANNUAL RECURRING (+/-) 1 ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 3 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) C. GOST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) E. BASELINE EQUIP. REPLCMNT. \$0 c. \$0 d. \$0 c. \$0 c. \$0 f. TOTAL \$0 \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3+3A4+(3Bf1)/Economic Life)) \$850 6. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 5. TOTAL NOT DISCOUNTED SAVINGS (-) / COSTS (-) (2F3+3A4+(3Bf1)/Economic Life)) \$850 6. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 5. TOTAL NOT DISCOUNTED SAVINGS (-) / COSTS (-) (2F3+3A4+(3Bf1)/Economic Life)) \$850 6. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 5. TOTAL NOT DISCOUNTED SAVINGS (-) / COSTS (-) (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR)		DAT	E OF NISTIR 85-3273-	10 USED FOR D	ISCOUNT	FACTORS:	JAN '96		
A. ELECT. \$7.33 0 \$0 13.80 \$0 B. DIST \$0.00 0 \$0 0.00 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL 160.33 \$850	İ		ENERGY	FUEL COS	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
B. DIST \$0.00 0 \$0 0.00 \$0 C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL 160.33 \$850			SOURCE	\$/MBTU (1) MB	TU/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5)	
C. NAT GAS \$5.30 160.33 \$850 17.76 \$15.092 D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL 160.33 \$850		A.	ELECT.	\$7.33	0	\$O	13.80	\$0	
D. COAL \$0.00 0 \$0 0.00 \$0 E. ELEC. DEMAND \$0 13.47 \$0 F. TOTAL 160.33 \$850		В.	DIST	\$0.00	0	\$ O	0.00	\$0	
E. ELEC. DEMAND F. TOTAL 160.33 \$850 > \$15,092 3. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/·) 1 ANNUAL MAINTENANCE \$0 \$0 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. b. c. d. e. f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$		C.	NAT GAS	\$5.30	160.33	\$850	17.76	\$15,092	
F. TOTAL 160.33 \$850> \$15,092 3. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 \$0 2 \$0 \$0 \$0 3 \$0 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 DISCOUNT DISCOUNTED COST (-) (11) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12		D.	COAL	\$0.00	0	\$ O	0.00	\$0	
3. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 2 \$0 \$0 3 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 \$0 B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST (-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15.092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12		E.	ELEC. DEMAND			\$O	13.47	\$0	
A. ANNUAL RECURRING (+/-) 1 ANNUAL MAINTENANCE \$0 \$0 2 \$0 \$0 3 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 \$0 B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP, REPLCMNT. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15.092 7. DISCOUNTED SAVINGS (2F5 + 3C) = \$15.092 7. DISCOUNTED SAVINGS (2F6 - 3C) = \$15.092 7. DISCOUNTED SAVINGS (6/16) = 0.12		F.	TOTAL		160.33	\$850		>	\$15,092
\$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$0 \$	3.		ANNUAL RECURRING	(+/-)		\$ 0		\$O	
### ### ##############################			2			\$O		\$0	
B. NON-RECURRING (+/-) ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$0 b. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (+) / COSTS (-) (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12			3			\$O		\$0	
ITEM SAVINGS (+) YEAR OF DISCOUNT DISCOUNTED COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$0 b. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12			4 TOTAL ANNUAL DI	SC. SAVINGS (+	-) / COST	\$0	•	\$0	
COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$0 b. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (+) / COSTS (-) (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12		В.	NON-RECURRING (+/-	-)					
(TABLE A-2) a. BASELINE EQUIP. REPLCMNT. b. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12			ITEM	SA	/INGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
a. BASELINE EQUIP. REPLCMNT. \$0 b. \$0 c. \$0 d. \$0 e. \$0 f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12				cos	ST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)	
b. c. d. e. f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = \$152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) \$0 \$0 \$0 \$1 \$2 \$3 \$4 \$5 \$5 \$6 \$6 \$6 \$6 \$6 \$6 \$6 \$6							(TABLE A-2))	
c. d. e. f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) 6. TOTAL NET DISCOUNTED SAVINGS 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) \$0 \$0 \$0 \$0 \$2 \$4 \$5 \$5 \$5 \$6 \$7 \$6 \$7 \$7 \$7 \$7 \$7 \$7 \$7			a. BASELINE EQUIP. RE	EPLCMNT.				\$0	
d. e. f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3+3A4+(3Bf1/Economic Life)) 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12			b.					\$0	
e. f. TOTAL \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) 6. TOTAL NET DISCOUNTED SAVINGS 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) \$0 \$0 \$0 \$1 \$2 \$4 \$5 \$5 \$6 \$7 \$7 \$7 \$7 \$7 \$7 \$7 \$7 \$7			c.					\$0	
f. TOTAL \$0 \$0 C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12			d.					\$0	
C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) = \$0 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3 + 3A4 + (3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12			e.					\$0	
4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3+3A4+(3Bf1/Economic Life)) \$850 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12			f. TOTAL		\$0			\$0	
5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12		C.	TOTAL NON-ENERGY	DISCOUNTED SA	AVINGS (+	-) OR COST (-)	(3A4 + 3Bf4) =		\$0
5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) = 152.22 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12	4.	FIRS	ST YEAR DOLLAR SAVI	NGS (+) / COST	'S (-)	(2)	F3 + 3A4 + (3Bf1/E	Economic Life))	\$850
6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) = \$15,092 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12							·		
7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) = 0.12					•	,			
					RATIO (SIR	3)			·
					•		- · · · ·		

ENGIN	IEER'S OI	ENGINEER'S OPINION OF PROBABLE COST					SHFFT	-	2	_
PROJECT	_	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Wo	od, MO			DATE PREPARED	PARED	- 1	B Ech OG
ENGINEER	۲. د	neers, Inc.					ESTIMATOR	JR J		D Sinz
		Denver, CO					CHECKED BY	ВУ	Y V	A. Niemever
9.5	fom Dofor			W/	MATERIAL COST	ST		ABOR COS		
Š.	Code	item Description	Unit of Measure	, iii	Cuit	i i	Crew/	Hours/		
-		BUILDING 826	Measure	Guaillity	COSI	lotal	Worker	Cuit	Total	TOTAL
2		INSTALL 3.5" BATT INSULATION ON WALLS								
က										
4	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	17785.0	\$0.18	\$3 224	1-CARD	2000	420074	107 04
က	۵	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	17195.0	\$0.20	\$3.445	2.CABD	0.00	#3,27 I	\$6,495
ဖ	ISW	INSTALL 2"x4" STUDDED WALL 2' OC	L.F.	9341.0	\$0.24	\$2.201	F.2	0.00	415,500	\$18,805
<u>_</u>	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	17785.0	\$0.07	\$1,188	1-PORD	0.01	54 293	\$5,034 \$5,480
0 0	K13B	KELUCA I E 15' HIGH 104' LONG BLEACHERS	EA.	1.0	\$0.00	\$0	F-5	56	\$6 124	\$6.124
ه ا د	K4WMH	RELOCATE 4:0" BASEBOARD RADIATION	EĄ.	3.0	\$18.39	\$55	9-0	4.48	\$1.176	\$1 231
2 =	Mag	BELOCATE BATHDOOM SHIM	Ë	2.0	\$0.00	\$0	L-2	24	\$2,227	\$2,227
15		DELOCATE DALIFICOTO MIRROR	EA.	1.0	\$0.00	\$0	1-CARP	0.356	\$6	6\$
1 5		DELOCATE 5/4 ELECTRICAL CONDUIT	ا نــ		\$1.16	\$3	1-ELEC	0.089	\$8	\$12
14	ī	DELOCATE ELECTRIC DISCONNECT SWITCH	Ğ.	6.0	\$0.00	\$0	1-ELEC	5.2	\$950	\$950
<u> </u>		RELOCATE ELECTRICAL EXIL SIGN	Ë.	1.0	\$0.00	\$0	1-ELEC	1.5	\$46	\$46
2 4	T	DELOCATE ELECTRICAL LIGHT SWITCH	Ä	2.0	\$8.82	\$18	1-ELEC	0.844	\$51	\$69
17		RELOCATE ELECTRICAL OUTLET	Ë.	2.0	\$7.97	\$16	1-ELEC	0.896	\$55	\$70
18	j	RELOCATE FIRE EXTINCITIONED	Ę.	1.0	\$0.00	\$0	R-3	24	\$2,487	\$2,487
19		REMOVE GYM I OCKED	. F	0.	\$0.00	\$0	1-CARP	0.2	\$5	\$5
20	C		: E	1.0	\$0.00	\$0	1-CARP	0.9	\$24	\$24
7	- ;	RELOCATE SPEAKED	! E	1.0	\$8,371.35	\$8,371	3-CARP	88	\$6,936	\$15,307
22		REI OCATE THERMOSTAT	Ä.	2.0	\$0.00	\$0	1-ELEC	1.5	\$91	\$91
23		REI OCATE FAN COIL LINIT		2.0	\$0.00	Q\$	1-ELEC	1.7	\$103	\$103
24	1	INSTALL 5/8" WATERPRE BRD - TAPED & SANDE	η Ή	0.5	\$20.30	\$20	9-0	5.67	\$496	\$516
25	<u> </u>	INSTALL CERAMIC TII F 4.1/4" v 4.1/1" TII E	- L	0.000	\$0.90	\$263	Z-CARP	0.02	\$620	\$1,183
26		i		0.080	\$1.83	\$1,081	2-TILE	0.084	\$2,400	\$3,481
27		SUBTOTAL			-	\$20 18E			000	
28	DIFF	DIFFICULTLY FACTOR			E0/	\$50,100			401,300	1,551
29		SUBTOTAL			0.70	107			\$2,568	\$2,568
30	HO	OVERHEAD				\$20,185			\$53,934	\$74,120
31		SUBTOTAL	:	:	17%	\$3,432			\$9,169	\$12,600
32	PRO	PROFIT				\$23,617			\$63,103	\$86,720
33		SUBTOTAL			10%	\$2,362			\$6,310	\$8,672
34	CONT	CONTINGENCY	:			\$25,979			\$69,413	\$95,392
35	-၀				20%	\$5,196	:		\$13,883	\$19,078
						\$31,1/4			\$83,296	\$114,470

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

							DDO JECT NO.	1406-011
		LOCATION:	Fort Leonard V		REGION: 2 (Missouri)		PROJECT NO:	
		PROJECT TITLE:	Limited Energy	Study, Insu	late Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96	1	ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INVE	ESTMENT:	BLDG 826 - IN	ISTALL 1.5"	RIGID INSULATION (ON WALLS		
	Α.	CONSTRUCTION COS	ST	=			\$123,094	
	В.	SIOH COST	(7.09	% of 1A) =			\$8,617	
	C.	DESIGN COST	(6.09	% of 1A) =			\$7,386	
	D.	TOTAL COST	(1A +	1B +1C) =			\$139,097	
	E.	SALVAGE VALUE OF	EXISTING EQU	IPMENT =			\$0	
	F.	PUBLIC UTILITY COM	IPANY REBATE	=			\$0	
	G.	TOTAL INVESTMENT	(1D	-1E -1F) =			>	\$139,097
2.	ENE	RGY SAVINGS (+) OF	R COST (-):					
		E OF NISTIR 85-3273		DISCOUNT	FACTORS:	JAN '96		
		ENERGY	FUEL COS	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
		SOURCE	\$/MBTU (1) N	IBTU/YR (2)	SAVINGS (3)	FACTOR (4)	SAVINGS (5)	
	Α.	ELECT.	\$7.33	0	\$ O	13.80	\$0	
		DIST	\$0.00	0	\$ 0	0.00	\$0	
	-	NAT GAS	\$5.30	166.97	\$885	17.76	\$15,717	
		COAL	\$0.00	0	\$0	0.00	\$0	
		ELEC. DEMAND			\$0	13.47	\$0	
	F.			166.97	\$885		>	\$15,717
		N-ENERGY SAVINGS (ANNUAL RECURRING ANNUAL MAINTEI ANNUAL MAINTEI THE STATE OF TH	G (+/-) NANCE		\$0 \$0 \$0 \$0		\$0 \$0 \$0 \$0	
				(1), 000.	, -			
	В.	NON-RECURRING (+			VEAD OF	DISCOURT	DISCOUNTED	,
		ITEM		AVINGS (+)	YEAR OF	DISCOUNT	SAVINGS/COST (4)	
			C	OST(-) (1)	OCCURRENCE (2)	(TABLE A-2)		'
		DA 051 (N.S. 501 N.S. 1	DEDI CANT			(IAULE A-Z)	\$O	
		a. BASELINE EQUIP.	HEPLOMNI.				\$0	
		b.					\$0	
		c.					\$0	
		d.					\$0	
		e.		\$0			\$0	
	_	f. TOTAL TOTAL NON-ENERGY	V DICCOLINITED		LLOR COST (A	(3A4 + 3Bf4) =	***	\$0
	C.	IOTAL NON-ENERG	חושרטטאונה	SAVIIVOS (*	-) On COS1 (-)	1074 0014/		, 0
4.	FIR	ST YEAR DOLLAR SA	VINGS (+) / CC	STS (-)	(2	F3 + 3A4 + (3Bf1/E	Economic Life))	\$885
ш		IPLE PAYBACK (SPB)			YEARS TO QUALIFY)	(1G/4) =		157.18
11		TAL NET DISCOUNTE				(2F5 + 3C) =		\$15,717
11		COUNTED SAVINGS-		T RATIO (SIF	₹)	(6/1G) =		0.11
 7.	סוט							

ENGIN	EER'S OI	ENGINEER'S OPINION OF PROBABLE COST					SHEET	-	P	1
PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woo	od, MO			DATE PREPARED	EPARED	18-	18-Feb-96
ENGINEER	ĸ.	E M C Engineers, Inc.					ESTIMATOR	JR.	O.	D. Sinz
		Denver, CO					CHECKED BY) BY	A. N	A. Niemeyer
	:	1		/W	MATERIAL COST	ST	11-1	ABOR COST	T.	
No.	Item Keter Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-		BUILDING 826							1000	10.0
2		INSTALL 1.5" RIGID INSULATION ON WALLS								
က										
4	11-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	17785.0	\$0.59	\$10,519	1-CARP	0.008	\$3,738	\$14,258
2	۵	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	17195.0	\$0.20	\$3,445	2-CARP	0.017	\$15,360	\$18,805
ဖ	IFS	INSTALL 3/4"x2" FURRING STRIPS	Ë.	7693.0	\$0.19	\$1,468	1-CARP	0.016	\$3,234	\$4,702
7	ПСР	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	17785.0	\$0.07	\$1,188	1-PORD	0.01	\$4,293	\$5,480
∞ (R15B	RELOCATE 15' HIGH 104' LONG BLEACHERS	EA.	1.0	\$0.00	\$0	٦. ئ	29	\$6,124	\$6,124
თ :	R4WMH	RELOCATE 4'-0" BASEBOARD RADIATION	EĄ.	3.0	\$18.39	\$55	Q-6	4.48	\$1,176	\$1,231
2	RBBR	RELOCATE BASKETBALL BACKBOARD & RIM	EA.	2.0	\$0.00	\$0	L-2	24	\$2,227	\$2,227
=	RBM		EA.	1.0	\$0.00	\$0	1-CARP	0.356	6\$	6\$
12	REC	- 1	<u>ٿ</u>	3.0	\$1.16	\$3	1-ELEC	0.089	8\$	\$12
<u>.</u>	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	EA.	6.0	\$0.00	\$0	1-ELEC	5.2	\$950	\$950
4	REES		EA.	0.1	\$0.00	\$0	1-ELEC	1.5	\$46	\$46
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	Ë.	2.0	\$8.82	\$18	1-ELEC	0.844	\$51	69\$
16	REO	RELOCATE ELECTRICAL OUTLET	EĄ.	2.0	\$7.97	\$16	1-ELEC	0.896	\$55	\$70
1/	RES	RELOCATE ELECTRIC SCOREBOARD	EA.	0.1	\$0.00	\$0	R-3	24	\$2,487	\$2,487
20	RFE	RELOCATE FIRE EXTINGUISHER	Ę.	1:0	\$0.00	\$0	1-CARP	0.2	\$5	\$5
19	RGL String		Ä	1.0	\$0.00	\$0	1-CARP	6.0	\$24	\$24
2 2	KMWKC	RELOCATE MAPLE WALL IN RACQUETBALL CRT.	Ē	1:0	\$8,371.35	\$8,371	3-CARP	88	\$6,936	\$15,307
77	S I	RELOCATE SPEAKER	Ë	2.0	\$0.00	\$0	1-ELEC	1.5	\$91	\$91
77	Y (RELOCATE THERMOSTAT	EA.	2.0	\$0.00	\$0	1-ELEC	1.7	\$103	\$103
3 2	KFCU	RELOCATE FAN COIL UNIT	Ä	1.0	\$20.30	\$20	9-0	5.67	\$496	\$516
47	8/c-9/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	590.0	\$0.96	\$563	2-CARP	0.02	\$620	\$1,183
22	2	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	290.0	\$1.83	\$1,081	2-TILE	0.084	\$2,400	\$3,481
27		SUBTOTAL				¢26 748			A54 454	677 400
28	DIFF	DIFFICULTLY FACTOR			20%	21.07			40 F00	401,102
29					R	900 110			77C'7¢	77C'7¢
2 6	2	יייייייייייייייייייייייייייייייייייייי				\$50,748			\$52,956	\$79,704
ر ا	5	OVERHEAD			17%	\$4,547			\$9,002	\$13,550
ا ا ا		SUBIOTAL				\$31,295			\$61,958	\$93,253
32	PRO	PROFIT			10%	\$3,130			\$6,196	\$9,325
33		SUBTOTAL	:			\$34,425			\$68,154	\$102,579
8 g		CONTINGENCY			20%	\$6,885			\$13,631	\$20,516
သ	I U I AL COS I	81				\$41,309			\$81,785	\$123,094

E M C ENGINEER	RS, INC.					DATE:	Feb-9
PROJECT: LIMITED ENER	GY STUDY, INSULATE B	RICK BUILI	DINGS			BY:	DN
CLIENT CONTRACT NO.: I	DACA 01-94D-0033					JOB:	1406.01
OCATION: FT LEONARD	WOOD, MO.					CHK:	A
						FILE:	826BI
BU	ILDING HEATING I	OAD C	ALCULA'	TION SHEE	T		
BLDG NO: 826	BLDG NAME:	GYMNASI	UM				
BLDG FUNCTION:	BASKETBALL, RA			IT LIFTING			
FLOOR AREA: (SQ. FT)	19,827					# FLOORS	1
SLAB PERIMETER: (FT)	588					_	
. AREAS: ([] FIELD VEF	SIEIED EI EVATION DI ANI	21					
. AnLAS. IL J FIELD VER	WILD ELEVATION FEAR.	NORTH	south T	EAST	WEST	TOTAL	
WALLS, GROSS	(SQ. FT)	5,844	6,252	3,420	2,660	18,176	
GLASS	(SQ. FT)	42	55	0	0	97	
PERSONNEL DOOR	(SQ. FT)	84	168	42	0	294	
NSULATED PANEL	(SQ. FT)	345	324	0	120	789	
WALLS, NET	(SQ. FT)	5,373	5,705	3,378	2,540	16,996	
ROOF AREA (OR CEILING A NSULATED PANEL			D) PERSONNE	I DOOR	(SQ. FT)	19,827	
BASEMENT WALLS	(SQ. FT) (SQ. FT)	789	O	L DOOR 0	(SQ. FT)	294	
I. CONSTRUCTION: ([] WALLS: (SKETCH CROSS		ROOF, WIN	DOW, DOC		OMPONEN	TC T	R-VALUE
WALLS: (SKETCH CHUSS	SECTION OF WALL)				OUTSIDE	·	0.1
					4" FACE I		0.4
					AIR SPAC		0.9
				4.	6" CONCI	RETE BLK	1.8
				5.			
				6.	11.015 = 41		
				7.	INSIDE AI		0.6
					TOTAL	R-WALL = U = 1/R	4.0 0.24
						0-1/1	0.24
ROOF: (SKETCH CROSS S	SECTION OF ROOF)			cc	OMPONEN	TS	R-VALUE
·				. 1.	OUTSIDE	AIR FILM	0.1
					BUILT UP		0.3
						NSULATION	8.00
					1" FORM	D GYPSUM	1.80
				6.	1 FORIVI	BOAND	1,21
					INSIDE AI	R FILM	0.68
					TOTAL F	R-ROOF =	12.19
						U = 1/R	0.08
01 4 0 0 7 1 2 7		510 S : ==	141517 ==				
GLASS TYPE: SLAB TYPE FLOOR:	PPG 'PENNVERNO CEMENT	JN C.L. T	WNDV, SS	4, .88 S.C.		R-GLASS SLF	1.6° 0.8°
BASEMENT TYPE:	NONE					R-BASEM.	0.8
INSULATED PANEL:	HOHL					R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL					R-PDOOR	2.56
II. INFILTRATION:						· · · · · · · · · · · · · · · · · · ·	····
TIGHT WALL H/M/L (SQ.F)	Т.)		X CFM /	SQ.FT.	0.000	=	(
AVG. WALL H/M/L (SQ.FT.		18176	X CFM /		0.115	=	2,09
EAKY WALL H/M/L (SQ.F			X CFM /		0.000	=	(
DOOR OPENINGS / HR - SI	NGLE DOOR			OPENING /HR	1.600	=	
DOOR OPENINGS / HR - DO	OUBLE DOORS	40		OPENING /HR	1.385	=	5
			TOTAL INF	ILTRATION (CI	FM)	=	214
UA PANEL	PANEL AREA	789		X PANEL "U"	0.238	=	18
UA PDOOR	PDOOR AREA	294		X DOOR "U"	0.391	=	11
UA WALL	WALL AREA	16,207		X WALL "U"	0.245	=	4,16
UA ROOF	ROOF AREA	19,827		X ROOF "U"	0.082	=	1,62
UA GLASS	GLASS AREA	97		X GLASS "U"	0.621	=	6
UA SLAB	SLAB PERIM.	588		X SLF	0.830	=	48
UA BASEM.	B-WALL AREA	0	· · · · · · · · · · · · · · · · · · ·	X BASE. "U"	0.000	=	0.00
INFILTRATION	N CFM	2146		X A. T. F.	1.035	=	2,22
<u> </u>							

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

PREPARED BY CHECKED BY:

DMS AJN

FILE: BLDG: 826Z1 826

4

ZONE:

	Rate	s of H	eat Gain from Occupants of Co	nditioned Spaces				
Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	(BTU/H)
1	5	4	Seated, light work, typing	Offices, hotels, apts	250	200	1,250	1,000
	80		Heavy work, athletics	Gymnasium	710	1,090	56,800	87,200
TOTA	85					TOTAL	58,050	88,200

			Peak Wattage Value for Lights		
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	40		Merc. Vap Medium Base, 75w with 18w ballast	93	3,720
	10		Incandescent - 60w	60	600
	34	16	Fluorescent, 2 - 15w lamps, 5w ballast	35	1,190
l t	10		Fluorescent, 2 - 34w lamps, 4w ballast (2x4 ft. fixture)	72	720
	35		HPS - Medium Base, 35w with 11w ballast	46	1,610
	3	38	Merc. Vap Mogul Base, 175w with 25w ballast	200	600
TOTA	132			TOTAL	8,440

			Peak Value for Internal Gains				
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)
1	1		Microcomputer	350	91%	350	1,195
	1		Coffee Maker	1,500	30%	1,500	5,120
İ	1		Radio	71	10%	71	242
	2		Water Cooler	700	50%	1,400	4,778
	1		Television (Color, tube)	300	15%	300	1,024
	2		Cold Food/Beverage	1,535	50%	3,070	10,478
			y				
l							
l							ļ
1				TOTAL	46%	6,691	22,836

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.: 1406-011

DATE:

26-Jan-96

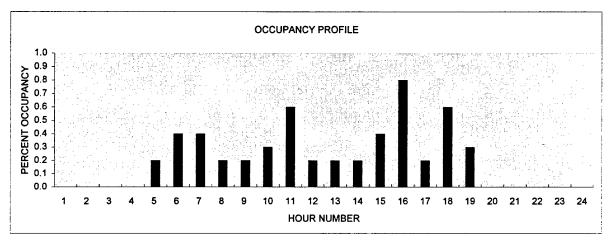
PREPARED BY: DMS CHECKED BY: AJN

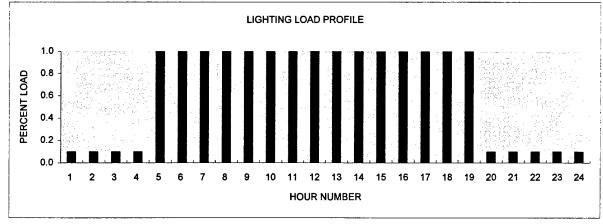
826Z1

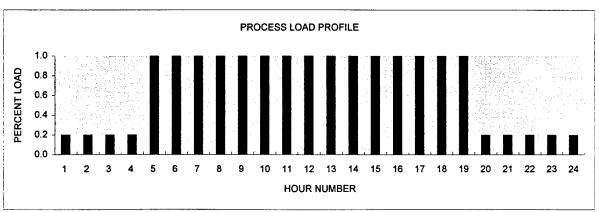
FILE: BLDG:

826 ZONE:

BLDG	BLDG	TYPE OF									ı	HOU	RNU	MBEF	1											
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
6	Gym	OCCUPANC	0.0	0.0	0.0	0.0	0.2	0.4	0.4	0.2	0.2	0.3	0.6	0.2	0.2	0.2	0.4	0.8	0.2	0.6	0.3	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.1	0.1	0.1	0.1	0.1
L		PROCESS	0.2	0.2	0.2	0.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.2	0.2	0.2	0.2	0.2







```
BLDG 826 - GYMNASIUM BASELINE
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
                                1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA ------
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1)
                            37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
                                                 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                               9.000000E-03
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 553768.100000
FLOOR AREA (SQFT) 19827.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 2376820.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)
                                                  0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 198270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 2146.000000
INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00

                                                                        1.00
1.00
 1.00
         1.00
 1.00
           1.00
        1.00
                                                                            1.00
 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 2.330000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 48600.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 488.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 115.000000 WINDOW GLASS NUMBER (NG) 30
                                             6.930472E-01
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
```

WALL DATA

	יאל הנאאוי	· A		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	6029.0	2660.0	5718.0	3378.0
WINDOW AREA SQFT (AWND)	55.0	.0	42.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	5.5	. 0	4.2	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	.0	. 0

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0	120.0	120.0	120.0
WALL TRANSFER FUNCTIONS	.245	.245	.245	.245
CN FACTORS	.01837	.01837	.01837	01837
CN FACTORS NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1 N=2 N=3 N=4 N=5	.00003	.00003	.00003	.00003
N=2	.00283	.00283	.00283	.00283
N=3	.01017	.01017	.01017	.01017
N=4	.00498	.00498	.00498	.00498
N=5	.00037	.00037	.00037	.00037
N=6	*****	*****	*****	*****
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6	*****	******	*****	*****
ROOF AREA SQFT (AROF) 19827	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	5.2263	74E-03		
ROOF B TRANSFER FUNCTIONS (BNR				
.901E-04 .225E-02 .261E-02		900.	900.	
ROOF D TRANSFER FUNCTIONS (DNR 1.00 -1.16 .223)			
SKYLIGHT TILT DEGREES (TILT)			999.	
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT ET (SKH)	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0. SKYLIGHT WIDTH FT (SKW) 0.0	000000000000000000000000000000000000000			
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT			00E±00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR S	HSK (MND, N	DND)	1	1
SKY LIGHT AREA SOFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-H	R-F (SKYU)	1.:	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.600000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					FOINT	EG F
	KW		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	10505.	58050.	88200.		
HOUR	H	OURLY FRAC	TION OF PE	AK		
1	.100	.200	.000	.000	68.0	.0
2	.100	.200	.000	.000	68.0	.0
3	.100	.200	.000	.000	68.0	.0
4	.100	.200	.000	.000	68.0	.0
5	1.000	1.000	.200	.200	68.0	.0
6	1.000	1.000	.400	.400	68.0	.0
7	1.000	1.000	.400	.400	68.0	.0
8	1.000	1.000	.200	.200	68.0	.0

```
.200
                                               68.0
         1.000
                 1.000
                           .200
                                    .300
                            .300
                                               68.0
                                                          . 0
  10
         1.000
                 1.000
                 1.000
                                               68.0
                                     .600
  11
          1.000
                            .600
                                                           .0
                 1.000
                                              68.0
                            .200
                                     .200
  12
          1.000
                                                           .0
                 1.000
                            .200
                                              68.0
 13
          1.000
                                     .200
                                                           .0
                                              68.0
                           .200
 14
          1.000
                                     .200
                                                           .0
                                   .400
.800
                 1.000
                           .400
 15
          1.000
                                               68.0
                                                           .0
                1.000
                           .800
                                              68.0
 16
          1.000
                                                           .0
                                              68.0
                1.000
                           .200
                                    .200
 17
         1.000
                                                           .0
                                              68.0
 18
         1.000
                1.000
                           .600
                                    .600
                                                           .0
                1.000
                                    .300
                                              68.0
         1.000
                                                           .0
 19
                           .300
                 .200
                                              68.0
                                                          .0
         .100
                                    .000
 20
                           .000
                                    .000
                                                          .0
          .100
                   .200
                            .000
                                              68.0
 21
                                                          .0
 22
          .100
                   .200
                            .000
                                    .000
                                              68.0
 23
          .100
                  .200
                            .000
                                    .000
                                               68.0
                                                          .0
                                     .000
          .100
                   .200
                            .000
                                               68.0
                                                          .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                       100.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 45480.000000
ECONOMIZER HIGH TEMP LIMIT F 100.000000
SYSTEM SUPPLY AIR START TIME HR
                            0.000000E+00
                               24.000000
SYSTEM SUPPLY AIR STOP TIME HR
SYSTEM MIXED AIR TEMP(TMXAIR)
                             70.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)
                                         1.000000
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 3.750000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 2376820.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 2971025.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                       .286 .300 .369
                                                     .400
                                                             .451
.100
        .191
                .200
 .500
         .537
                  .600
                           .625
                                   .700
                                            .718
                                                     .800
                                                              .812
                          1.00
.900
         .906
                  1.00
CHILLER TYPE (ITYPCH)
                           4
COOLING PLANT RATED OUTPUT BTU (CFLOT)
                                   1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN)
                                  0.00000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000
     .000 .000 .000
                                        .000
                                                     .000
                                                             .000
.000
         .000
                 .000
                          .000
                                   .000
                                            .000
                                                     .000
                                                             .000
.000
         .000
                 .000
                          .000
```

BEACON Energy Analysis By EMC Engineers, Inc. 826.I

BLDG 826 - GYMNASIUM BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

MNT	H LOAD		SOLAR THRU WINDOW		PARTITN DOOR AND SLAB	BSMT	WAI.I.	WINDOW	VENT AND V INFL	I.ATENT
	0.					0.			0.	0.
	-1152.	LOSS		-42.	-14.	0.	-78.	-1.	-1057.	0.
FEB	0.	GAIN	2.	0.	0.	Ο.	1.	0.	0.	0.
	-929.			-34.	-12.	0.	-55.	-1.	-865.	0.
MAR	0.	GAIN	2.	0.	0.	Ο.	6.	0.	1.	0.
	-898.	LOSS							-857.	0.
APR	0.	GAIN	2.	0.	Ο.	Ο.	15.	0.	4.	0.
	-415.			-17.	-6.	0.	-22.	-1.	-427.	0.
YAM	0.		2.	1.	0.	Ο.	25.	0.	6.	0.
	-180.			-7.	-3.	0.	-7.	0.	-233.	0.
	.00				.16	.00	31.80	.01	7.28	.00
		LOSS					-1.74			.00
	.00		2.43			.00				.00
	-11.56				-1.87	.00			-90.60	.00
	.00		2.11		.24				11.47	.00
	-10.07		_		-1.77		-1.63			.00
SEP	0.		2.	0.	0.	Ο.	20.		10.	0.
0.57	-132.		_		-3.	0.	- / .	υ.	-182.	0.
OCT	0.				0.				4.	0.
***	-415.				-6.		-23.		-421.	0.
NOV	0.		1.		0.		3.			0.
	-704.			-28.			-44.	-	-666.	0.
	0.		1.	0.	0. -13.	0.	0. -74.		1.	0.
	-1120.					0.	-74.	-1.	-1033.	0.
	0.		23.	5.	1.	0.	174.	Ο.	57.	0.
	-5990.				-83.					0.
MAX	HEATING	LOAD=	-2376	820. B	TUH ON DE	C 28	HOUR 9	AMB:	IENT TEMP	31.
MAX	COOLING	LOAD=		0. B	TUH ON DE	C 31	HOUR 24	AMB:	IENT TEMP	42.

ZONE UA BTU/HR-F 6158.3

BEACON Energy Analysis By EMC Engineers, Inc. 826.I

BLDG 826 - GYMNASIUM BASELINE

INTERN	ΔΤ.								FAN 1	TOTAL
1111 2141		RNAL	SPACE			COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
		IPERAT				CIDENT	THOUSAND			
MONTH								BTU	BTU	BTU
JAN	65.	68.		4	16	63.	4.16	11.89	9.24	38.27
			25.	29	3	10.				
FEB	65.	69.		13	16	68.	3.76	10.74	8.35	34.57
			36.	19	7	13.				
MAR	67.	79.		28	16	76.	4.16	11.89	8.83	37.86
			49.	14	7	18.				
APR	70.	88.		30	15	84.	4.03	11.51	8.22	36.31
			65.	9	4	31.				
MAY	73.	94.		26	19	75.	4.16	11.89	7.49	36.52
			67.	11	4	38.				
JUN	77.	97.		30	19	82.	4.03	11.51	6.47	34.56
			68.	18	4	57.				
JUL	81.	106.		28	18	90.	4.16	11.89	6.63	35.66
			67.	2	3	70.				
AUG	79.	100.		11	19	84.	4.16	11.89	7.06	36.08
			67.	6	3	69.				
SEP	75.	99.		2	18	86.	4.03	11.51	6.61	34.70
			67.	10	3	69.				
OCT	69.	87.		1	15	85.	4.16	11.89	8.24	37.26
			67.	11	4	39.				
NOV	68.	79.		8	15	76.	4.03	11.51	8.76	36.85
			55.	2	23	20.				
DEC	64.	69.		23	16	67.	4.16	11.89	9.17	38.20
			6.	18	7	-1.				
YEAR							48.98	140.03	95.08	436.84

BEACON Energy Analysis By EMC Engineers, Inc.

826.I

BLDG 826 - GYMNASIUM BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BT	
MONTH	HEATING	ECONOMIZER	HEATING (COOLING	HEATING	COOLING
JAN	744	0	180	0	2377E+07	.0000
FEB	671	0	138	0	2377E+07	.0000
MAR	692	0	91	0	2377E+07	.0000
APR	522	0	4	0	2377E+07	.0000
MAY	398	0	0		1836E+07	.0000
JUN	135	0	0	•	6624E+06	.0000
JUL	76	0	0	_	5802E+06	.0000
AUG	68	0	0	-	4572E+06	.0000
SEP	266	0	0		1431E+07	.0000
OCT	543	0	0		2154E+07	.0000
NOV	664	0	43		2134E+07	.0000
DEC	738	0	236	-	2377E+07	.0000
YEAR	5517	0	692	_	2377E+07	.0000

BEACON Energy Analysis By EMC Engineers, Inc. 826.I

SYSTEM TOTALS

		ENERG	TOTAL INTERNAL MAXIMUM				
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
MONTHI	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND
MONTH	I BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	1510.68	.00	4.16	11.89	2.71	38.27	12.1
FEB	1241.73	.00	3.76	10.74	2.45	34.57	12.1
MAR	1216.91	.00	4.16	11.89	2.59	37.86	12.1
APR	630.39	.00	4.03	11.51	2.41	36.31	12.1
MAY	339.56	.00	4.16	11.89	2.19	36.52	12.1
JUN	81.51	.00	4.03	11.51	1.90	34.56	12.1
JUL	45.32	.00	4.16	11.89	1.94	35.66	12.1
AUG	39.82	.00	4.16	11.89	2.07	36.08	12.1
SEP	240.58	.00	4.03	11.51	1.94	34.70	12.1
OCT	637.57	.00	4.16	11.89	2.41	37.26	12.1
NOV	999.62	.00	4.03	11.51	2.57	36.85	12.1
DEC	1480.53	.00	4.16	11.89	2.69	38.20	12.1
YEAR	8464.22	.00	48.98	140.03	27.86	436.84	12.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 447193. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 826.I

BLDG 826 - GYMNASIUM BASELINE

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY SOLAR	ACTUAL SOLAR								
	INSOL.	INSOL.								
		HORIZ.					HOUR	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM		M LOADS	COOLING	HEATING
	BTU/	BTU/	7	AMBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	180	.0000	2377E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	138	.0000	2377E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	91	.0000	2377E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	4	.0000	2377E+07
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.0000	1836E+07
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	6624E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	5802E+06
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	4572E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	1431E+07
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	2154E+07
NOV	1039.	732.	1.000	47.	0.	0.	0	43	.0000	2377E+07
DEC	883.	604.	1.000	35.	0.	0.	0	236	.0000	2377E+07

```
BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995
                  YEAR 1955
SITE LATITUDE DEG (AL1)
                                    37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                     1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                       56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 553768.100000
FLOOR AREA (SQFT) 19827.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 2376820.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 198270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 2146.000000
INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00
    1.00

A FACTOR IN INFILTRATION EQUATION (CINA) 2.330000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 48600.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 488.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 115.000000 WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                       WALL DATA
WALL DATA

WALL NUMBER
1 2 3 4

AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00

WALL AREA SQFT (AWLL) 6029.0 2660.0 5718.0 3378.0

WINDOW AREA SQFT (AWND) 55.0 .0 42.0 .0

WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0

WINDOW WIDTH FT (WNDW) 5.5 .0 4.2 .0

WIDTH OF OVERHANG (WOH) .0 .0 .0 .0

OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0
```

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSPER WINCTHONG				
CN FACTORS NUMBER OF BN FACTORS (NB	.00176	.00176	.00176	00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)		_		3
N=1	.00000	.00000	.00000 .00016	00000
N=1 N=2 N=3 N=4 N=5	.00016	.00016	00016	00000
N=3	.00086	.00086	00016	00016
N=4	.00066	.00066	00066	00066
N=5	.00008	00008	00000	00000
N=6	*****	******	******	.00000
NUMBER OF DN FACTORS (ND)	6	6	6	
DN FACTORS				
N=1 N=2 N=3 N=4 N=5	1.00000	1 00000	1 00000	1 00000
N=2	-1 71064	-1 71064	1.00000	1.00000
N=3	89735	99725	-1.71064	-1./1064
N=4	- 16643	16643	16643	.89/35
N=5	00728	10043	16643	16643
N=6	- 00028	.00728	.00728 00002	.00728
ROOF AREA SQFT (AROF) 19827	000002	00002	00002	00002
ROOF U VALUE BTU/HR-SQFT-F (URI	. 000000 	00002 00		
ROOF TRANS FUNCTIONS USED (1=YF	7 0.20	(TBOOE)	-	
ROOF C TRANSFER FUNCTION (CNR)	5 2262	(1ROOF)	1	
ROOF B TRANSFER FUNCTIONS (BNR)	3.2263	/46-03		
.901E-04 .225E-02 .261E-02	270F-03	900	000	
ROOF D TRANSFER FUNCTIONS (DNR)	.2702.03	500.	900.	
1.00 -1.16 .223		999	000	
SKYLIGHT TILT DEGREES (TILT)	0 000000	777. F±00	<i>999</i> .	
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999 000	200	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00	2222.000	300	
SKYLIGHT WIDTH FT (SKW) 0.00	0000E±00			
SKYLIGHT OVERHANG WIDTH FT (SKC	W) no	000008+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00F+00	
SKYLIGHT GLASS NUMBER (NS)	1	0.0000	7011400	
SKYLIGHT SHADING COEFFICIENT (S	HSK) O	0000008+00	1	
SUMMER START MONTH AND DAY FOR	SHSK (MST.	NDST)	, 1	1
SUMMER END MONTH AND DAY FOR SH	SK (MND.NT	ND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	00	-	1
DAYTIME SKY LIGHT II BTIL/COFT UD	Tr (CIZITA)		92998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKYU	JN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPAC	E (FAP)	4.600000E	:- O1
		,,		

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW		- BTU/HR -	·		
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	8.	10505.	58050.	88200.		
HOUR	H	OURLY FRAC	TION OF PE	AK		
1	.100	.200	.000	.000	68.0	.0
2	.100	.200	.000	.000	68.0	.0
3	.100	.200	.000	.000	68.0	.0
4	.100	.200	.000	.000	68.0	.0
5	1.000	1.000	.200	.200	68.0	.0
6	1.000	1.000	.400	.400	68.0	.0
7	1.000	1.000	.400	.400	68.0	.0
8	1.000	1.000	.200	.200	68.0	.0
						. 0

```
.200
                                           68.0
         1.0001.000.2001.0001.000.300
                                                        .0
                                  .300
 10
                                             68.0
                                                        .0
                          .600
                                  .600
         1.000 . 1.000
                                             68.0
 11
                                  .200
                                            68.0
                          .200
 12
         1.000 1.000
                                                        .0
                                  .200
                                            68.0
         1.000
                 1.000
                          .200
 13
                                                        .0
                                  .200
                                            68.0
         1.000
                                                        .0
                          .200
 14
                1.000
                                            68.0
                                                        .0
                                  .400
         1.000 1.000
                          .400
 15
                                                        .0
                                            68.0
                                  .800
         1.000 1.000
                          .800
 16
                          .200
                                  .200
                                                        .0
                                            68.0
 17
         1.000 1.000
                                                        .0
 18
         1.000
                1.000
                          .600
                                  .600
                                            68.0
                                                        .0
 19
        1.000
                 1.000
                          .300
                                  .300
                                            68.0
          .100
                 .200
                          .000
                                  .000
                                            68.0
                                                        .0
 20
 21
          .100
                  .200
                          .000
                                  .000
                                            68.0
                                                        . 0
 22
          .100
                  .200
                           .000
                                   .000
                                            68.0
                                                        .0
                           .000
          .100
                  .200
                                                        .0
                                   .000
                                             68.0
 23
                  .200
                           .000
                                                        .0
          .100
                                   .000
                                             68.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
                                     100.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 45480.000000
ECONOMIZER HIGH TEMP LIMIT F 100.000000
SYSTEM SUPPLY AIR START TIME HR
                            0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                             24.000000
                            70.000000
SYSTEM MIXED AIR TEMP (TMXAIR)
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR)
                                       1.000000
FAN EFFICIENCY (EFAN)
                  5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 3.750000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 2376820.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 2971025.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                  .400
.100
     .191 .200
                      .286 .300 .369
                                                          .451
.500
                 .600
                                 .700
                                         .718
                                                  .800
         .537
                         .625
                                                           .812
.900
        .906
                 1.00
                         1.00
CHILLER TYPE (ITYPCH)
                          4
COOLING PLANT RATED OUTPUT BTU (CFLOT)
                                 1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN) 0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000. 000. 000. 000. 000.
                                                  .000
                                                           .000
        .000 .000
 .000
                        .000
                                 .000
                                         .000
                                                  .000
                                                           .000
                         .000
 .000
                .000
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BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTI DOO AND	R			VENT AND	
MNT	H LOAD						WALL	WINDOW		LATENT
JAN	0.		2.	0.	0.	0.			0.	
		LOSS							-1074.	
FEB	0.	GAIN	2.	0.	0.	0.	0.	0.	0.	0.
	-903.	LOSS		-34.	-12.	0.	-14.	-1.	-878.	0.
MAR	0.	GAIN	2.	0.	0.	0.	1.	0.	1.	0.
	-875.				-11.	0.	-11.			0.
APR	0.	GAIN	2.	0.	0.	0.	3.	0.	4.	0.
	-403.	LOSS		-16.	-6.	0.	-4.	-1.	-421.	0.
MAY	0.	GAIN	2.	1.	0.	0.	6.	0.	5.	0.
	-181.	LOSS		-7.	-3.	0.	0.	0.	-222.	0.
	.00								6.96	.00
	-23.03	LOSS		-2.37	-1.52	.00	.00	12	-72.83	.00
	.00			2.21	.21	.00	8.79	.02	12.61	.00
	-12.42	LOSS		-2.27	-1.45	.00	.00	12	-70.83	.00
2110	0.0	CA TN								
					.23		7.89			.00
	-10.22	LOSS		-2.33	-1.38	.00	.00	11	-66.22	.00
CED	0.	CAIN	2	^	0	0	E	0	10.	0
SHE	-131.		۷.				-1.			0.
	-131.	1055		- / .	-3.	٥.	-1.	0.	-1/2.	0.
OCT	0.	GAIN	2.	0.	0.	0	1	0	3	0.
	-402.			-18.	-6.	0.	1. -5.	0	-417.	0.
								•		• •
NOV	0.	GAIN	1.	0.	0.	0.	0.	0.	1.	0.
	-677.	LOSS		-28.	-9.	0.	-11.	-1.	-668.	
DEC	0.	GAIN	1.	0.	0.	0.	0.	0.	0.	0.
	-1090.	LOSS		-41.	-13.	0.	-20.	-1.	-1054.	0.
	0.		23.	7.	1.	0.	41. -87.	0.	55.	0.
	-5821.	LOSS		-231.	-81.	0.	-87.	-7.	-5979.	0.
									IENT TEME	
XAM	COOLING	LOAD=		0.	BTUH ON	DEC 31	HOUR 24	AMB	IENT TEMP	42.

ZONE UA BTU/HR-F 2939.2

BEACON Energy Analysis By EMC Engineers, Inc. 826FG.I

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

									FAN T	CTAL
INTERNA					_		T TOURTHO	DDOGEGG	HEAT	HEAT GAIN
			SPACE			OIN-		PROCESS	MILLION	
MONTHE			URE F			IDENT		BTU	BTU	BTU
MONTH	AVG.	MAX	MIN	DAI	пк и	MIDI.	VMU	ы	D10	DIO
JAN	66	68.		4	16	63.	4.16	11 89	9.24	38.27
OAN	00.	00.	28.				1.10	22.03	2.25	
			20.	2,5	,	10.				
FEB	66.	69.		13	16	68.	3.76	10.74	8.35	34.57
			39.			13.				
MAR	67.	78.		28	16	76.	4.16	11.89	8.92	37.95
			52.	14	7	18.				
APR	69.	87.		30		84.	4.03	11.51	8.32	36.41
			67.	9	4	31.				
MAY	72.	88.		29		86.	4.16	11.89	7.38	36.41
			67.	11	4	38.				
	5.6	00		2.0	10	0.0	4.03	11.51	6.46	34.55
JUN	76.	92.	68.	30 18		82. 57	4.03	11.51	0.40	34.55
			60.	10	*	57.				
JUL	80	100.		15	18	92.	4.16	11.89	6.61	35.64
COL	00.	100.	68.			70.			• • • •	
			•••	_	_					
AUG	78.	98.		29	15	96.	4.16	11.89	7.03	36.06
			68.	6	3	69.				
SEP	74.	96.		2	16	91.	4.03	11.51	6.61	34.70
			68.	10	3	69.				
OCT	69.	86.		1		85.	4.16	11.89	8.26	37.29
			67.	10	24	34.				
					• •		4 02	11 51	8.73	36.82
NOV	68.	79.		8		7 7.	4.03	11.51	8.73	36.62
			56.	2	23	20.				
DEC	65.	70.		23	16	67.	4.16	11.89	9.17	38.20
DEC	65.	, , ,	9.			-1.	4.10		J.4.	20.20
			٠.	10	,					
YEAR							48.98	140.03	95.09	436.86

BEACON Energy Analysis By EMC Engineers, Inc. 826FG.I

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER	OF HOURS	WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS	WERE NOT	MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATIN	G COOLING	3	HEATING	COOLING
JAN	744	0	158	() -	2377E+07	.0000
FEB	671	0	131	() -	2377E+07	.0000
MAR	699	0	81	() -	2377E+07	.0000
APR	533	0	0	() -	2368E+07	.0000
MAY	396	0	0	C) -	1775E+07	.0000
JUN	145	0	0	C) -	6381E+06	.0000
JUL	76	0	0	C) -	5772E+06	.0000
AUG	71	0	0	C) -	4663E+06	.0000
SEP	272	0	0	C) -	1379E+07	.0000
OCT	552	0	0	C) –	2067E+07	.0000
NOV	666	0	39	c) -	.2377E+07	.0000
DEC	738	0	207	C) -	.2377E+07	.0000
YEAR	5563	0	616	c	-	.2377E+07	.0000

BEACON Energy Analysis By EMC Engineers, Inc. 826FG.I

SYSTEM TOTALS

			Y CONSUMPT		TOTAL INTERNAL MAXIMUM					
	HEATING MILLION	COOLING THOUSAND	LIGHTING THOUSAND	PROCESS MILLION	FANS THOUSAND	HEAT GAIN MILLION	ELECTRIC DEMAND			
MONTH		KWH	KWH	BTU	KWH	BTU	KW			
1101111	. 510	20002		210	20022	210				
JAN	1466.78	.00	4.16	11.89	2.71	38.27	12.1			
FEB	1212.83	.00	3.76	10.74	2.45	34.57	12.1			
MAR	1195.59	.00	4.16	11.89	2.61	37.95	12.1			
APR	625.08	.00	4.03	11.51	2.44	36.41	12.1			
MAY	337.79	.00	4.16	11.89	2.16	36.41	12.1			
JUN	87.11	.00	4.03	11.51	1.89	34.55	12.1			
JUL	46.06	.00	4.16	11.89	1.94	35.64	12.1			
AUG	42.01	.00	4.16	11.89	2.06	36.06	12.1			
SEP	241.80	.00	4.03	11.51	1.94	34.70	12.1			
OCT	629.02	.00	4.16	11.89	2.42	37.29	12.1			
NOV	972.05	.00	4.03	11.51	2.56	36.82	12.1			
DEC	1447.76	.00	4.16	11.89	2.69	38.20	12.1			
YEAR	8303.89	.00	48.98	140.03	27.86	436.86	12.1			

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 439107. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 826FG.I

BLDG 826 - GYMNASIUM ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL. ON WALLS

OTHER MONTHLY STATISTICS

CLEAR			•						
						שווחש	S WHEN	MAYIMIM	MAXIMUM
SURF.	SURF.		AVG.	MAX SYS	TEM				HEATING
BTU/	BTU/	Z	AMBT.						LOAD
SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
I DAY	DAY	FACTOR	F	+	-				
1041	675	7 000	2.5	0	•	•	150	0000	
1041.	6/5.	1.000	35.	0.	0.	Ü	158	.0000	2377E+07
1464.	929.	1.000	37.	0.	0.	0	131	.0000	2377E+07
1922.	1254.	1.000	43.	0.	0.	0	81	.0000	2377E+07
2312	1600	1 000		0	0	0	0	0000	02605 05
2312.	1000.	1.000	55.	0.	υ.	U	U	.0000	2368E+07
2566.	1826.	1.000	65.	0.	Ο.	0	0	.0000	1775E+07
2647.	1993.	1.000	72.	0.	0.	0	0	.0000	6381E+06
2546.	2015.	1.000	77.	0.	0.	0	0	.0000	5772E+06
							-		
2280.	1840.	1.000	76.	0.	0.	0	0	.0000	4663E+06
1856	1371	1 000	68	0	0	0	0	0000	1379E+07
2000.	23,1.	1.000	00.	0.	0.	O	O	.0000	13/9E+U/
1437.	953.	1.000	57.	0.	٥.	0	0	.0000	2067E+07
1039.	732.	1.000	47.	0.	0.	0	39	.0000	2377E+07
883.	604.	1.000	35.	0.	0.	0	207	.0000	2377E+07
	DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY 1041. 1464. 1922. 2312. 2566. 2647. 2546. 1856. 1437. 1039.	DAY ACTUAL SOLAR INSOL. INSOL. INSOL. HORIZ. HORIZ. SURF. SURF. BTU/ SQFT- DAY DAY 1041. 675. 1464. 929. 1922. 1254. 2312. 1600. 2566. 1826. 2647. 1993. 2546. 2015. 2280. 1840. 1856. 1371. 1437. 953. 1039. 732.	DAY ACTUAL SOLAR SOLAR SOLAR SOLAR SOLAR INSOL. INSOL. HORIZ. HORIZ. SURF. SURF. BTU/ BTU/ SQFT- SQFT- PF DAY DAY FACTOR 1041. 675. 1.000 1464. 929. 1.000 1922. 1254. 1.000 2312. 1600. 1.000 2566. 1826. 1.000 2546. 2015. 1.000 2546. 2015. 1.000 1856. 1371. 1.000 1437. 953. 1.000 1039. 732. 1.000	DAY ACTUAL SOLAR SOLAR INSOL. INSOL. HORIZ. HORIZ. SURF. SURF. AVG. BTU/ BTU/ AMBT. SQFT- SQFT- PF DEG. DAY DAY FACTOR F 1041. 675. 1.000 35. 1464. 929. 1.000 37. 1922. 1254. 1.000 43. 2312. 1600. 1.000 55. 2566. 1826. 1.000 65. 2647. 1993. 1.000 72. 2546. 2015. 1.000 77. 2280. 1840. 1.000 76. 1856. 1371. 1.000 68. 1437. 953. 1.000 57. 1039. 732. 1.000 47.	DAY ACTUAL SOLAR SOLAR INSOL. INSOL. HORIZ. HORIZ. SURF. SURF. AVG. MAX SYSTEM DEG. DEG. DEG. DEG. DEG. DAY DAY FACTOR F + 1041. 675. 1.000 35. 0. 1464. 929. 1.000 37. 0. 1922. 1254. 1.000 43. 0. 2312. 1600. 1.000 55. 0. 2566. 1826. 1.000 65. 0. 2546. 2015. 1.000 72. 0. 2280. 1840. 1.000 76. 0. 1856. 1371. 1.000 68. 0. 1437. 953. 1.000 57. 0. 1039. 732. 1.000 47. 0.	DAY ACTUAL SOLAR SOLAR INSOL. INSOL. HORIZ. HORIZ. SURF. SURF. AVG. MAX SYSTEM BTU/ BTU/ AMBT. TEMP. DRIFT SQFT- SQFT- PF DEG. DEG. F 1041. 675. 1.000 35. 0. 0. 1464. 929. 1.000 37. 0. 0. 1922. 1254. 1.000 43. 0. 0. 2312. 1600. 1.000 55. 0. 0. 2546. 1826. 1.000 65. 0. 0. 2546. 2015. 1.000 72. 0. 0. 2280. 1840. 1.000 76. 0. 0. 1856. 1371. 1.000 68. 0. 0. 1437. 953. 1.000 57. 0. 0. 1039. 732. 1.000 47. 0. 0.	DAY ACTUAL SOLAR SOLAR INSOL. INSOL. INSOL. INSOL. HORIZ. HORIZ. HORIZ. SURF. SURF. AVG. MAX SYSTEM SYSTEM BTU/ BTU/ AMBT. TEMP. DRIFT NOT SQFT- PF DEG. DEG. F COOL DAY DAY FACTOR F + - 1041. 675. 1.000 35. 0. 0. 0. 0 1464. 929. 1.000 37. 0. 0. 0 0 1922. 1254. 1.000 43. 0. 0. 0 0 0 2312. 1600. 1.000 55. 0. 0. 0. 0 0 2566. 1826. 1.000 65. 0. 0. 0 0 0 2546. 2015. 1.000 77. 0. 0. 0 0 2280. 1840. 1.000 76. 0. 0. 0 0 1856. 1371. 1.000 68. 0. 0. 0 1437. 953. 1.000 57. 0. 0. 0 0 1437. 953. 1.000 57. 0. 0. 0 0 1437. 953. 1.000 57. 0. 0. 0 0 1039. 732. 1.000 47. 0. 0. 0	DAY ACTUAL SOLAR SOLAR INSOL. INSOL. HORIZ. HORIZ. HORIZ. SURF. SURF. BTU/ BTU/ AMBT. TEMP. DRIFT NOT MET DAY DAY FACTOR F + - 1041. 675. 1.000 35. 0. 0. 0 158 1464. 929. 1.000 37. 0. 0. 0 131 1922. 1254. 1.000 43. 0. 0. 0 81 2312. 1600. 1.000 55. 0. 0. 0 0 2566. 1826. 1.000 65. 0. 0. 0 0 2546. 2015. 1.000 77. 0. 0. 0 0 2280. 1840. 1.000 76. 0. 0. 0 0 1856. 1371. 1.000 68. 0. 0. 0 0 1437. 953. 1.000 57. 0. 0. 0 0 1039. 732. 1.000 47. 0. 0. 0 39	DAY ACTUAL SOLAR SOLAR INSOL. INSOL. HORIZ. HORIZ. HORIZ. SURF. SURF. ANG. MAX SYSTEM SYSTEM LOADS COOLING BTU/ SQFT- PF DEG. DEG. F COOL HEAT BTU DAY DAY FACTOR F + - 1041. 675. 1.000 35. 0. 0. 0 158 .0000 1464. 929. 1.000 37. 0. 0. 0 131 .0000 1922. 1254. 1.000 43. 0. 0. 0 81 .0000 2312. 1600. 1.000 55. 0. 0. 0 0 .0000 2566. 1826. 1.000 65. 0. 0. 0 0 0 .0000 2546. 2015. 1.000 77. 0. 0. 0 0 0 .0000 2280. 1840. 1.000 76. 0. 0. 0 0 0 .0000 1437. 953. 1.000 57. 0. 0. 0 0 39 .0000

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BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
 SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
  FILE NAME MO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 553768.100000
FLOOR AREA (SQFT) 19827.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 2376820.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 198270.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 2146.000000
INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
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    1.00

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    1.00
    1.00
    1.00
    1.00

                                                        1.00 1.00
                                                                    1.00
                                                                                1.00
                                                                    1.00
                                                                               1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 2.330000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 48600.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 488.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 115.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                     WALL DATA
                                    1 2
.00 90.00
WALL NUMBER
                                                            3
AZIMUTH ANGLE (AZ)
                                                                       4
                                                 90.00 180.00
                                                                        -90.00
                                  6029.0 2660.0 5718.0 3378.0
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND) 55.0 .0 42.0 .0
WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0
WINDOW WIDTH FT (WNDW) 5.5 .0 4.2 .0
WIDTH OF OVERHANG (WOH) .0 .0 .0 .0
OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.055	.055	.055	.055
CN FACTORS	.00174	.00174	.00174	.00174
CN FACTORS NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	-00007	.00007	00007	00007
N=6	*****	*****	*****	******
N=1 N=2 N=3 N=4 N=5 N=6	6	6	6	6
DN FACTORS	_	-	-	· ·
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 19827	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)				
ROOF B TRANSFER FUNCTIONS (BNR				
.901E-04 .225E-02 .261E-02	.270E-03	900.	900.	
ROOF D TRANSFER FUNCTIONS (DNR)			
1.00 -1.16 .223	220E-02	999.	999.	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
	1			
SKYLIGHT SHADING COEFFICIENT (
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR SI	HSK (MND, N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-HI NIGHT TIME SKYLIGHT U BTU/SQFT-	K-F (SKYU)	1.2	292998	
				7 00
FRACTION OF PROCESS HEAT TO IN	LEKNAL SPA	CE (FAP)	4.6000001	5-U1

------THTERNAL GAINS AND PROFILES ------THERMOSTAT SET POINT DEG F

	KW		- BTU/HR - PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VA	L 8.	10505	. 58050.	88200.		
HOUR	H	OURLY FRAC	CTION OF PE	AK		
1	.100	.200	.000	.000	68.0	.0
2	.100	.200	.000	.000	68.0	.0
3	.100	.200	.000	.000	68.0	. 0
4	.100	.200	.000	.000	68.0	.0
5	1.000	1.000	.200	.200	68.0	.0
6	1.000	1.000	.400	.400	68.0	.0
7	1.000	1.000	.400	.400	68.0	.0
8	1.000	1.000	.200	.200	68.0	.0

9	1.000	1.000	.200	.200	68.0		. 0
10	1.000	1.000	.300	.300	68.0		.0
11	1.000	1.000	.600	.600	68.0		. 0
12	1.000	1.000	.200	.200	68.0		. 0
13	1.000	1.000	.200	.200	68.0		. 0
14	1.000	1.000	.200	.200	68.0		. 0
15	1.000	1.000	.400	.400	68.0		.0
16	1.000	1.000	.800	.800	68.0		. 0
17	1.000	1.000	.200	.200	68.0		.0
18	1.000	1.000	.600	.600	68.0		.0
19	1.000	1.000	.300	.300	68.0		.0
20	.100	.200	.000	.000	68.0		.0
21	.100	.200	.000	.000	68.0		.0
22	.100	.200	.000	.000	68.0		. 0
23	.100	.200	.000	.000	68.0		.0
24	.100	.200	.000	.000	68.0		. 0
NO HEATI	NG ABOVE AME	BIENT TEMP.	OF (THLKO	r) 68.	000000		
NO COOLI	NG BELOW AME	BIENT TEMP.	OF (TCLKO	r) 100.	000000		
SYSTEM T	YPE, (IECN)	2	}				
SUPPLY A	IR CFM (SACE	TM) 45480	.000000				
ECONOMIZ	ER HIGH TEME	LIMIT F	100.00	0000			
SYSTEM S	UPPLY AIR ST	CART TIME H	IR 0.000	000E+00			
	UPPLY AIR ST			000000			
	IXED AIR TEN						
	IDE AIR FRAC			1.0	00000		
	CIENCY (EFAN	•	000E-01				
	L PRESSURE 1		• •				
	PLANT RATED						
	PLANT RATED			971025.0000			
	PLANT PART I					400	453
.100	.191	.200	.286	.300	.369	.400 .800	.451 .812
.500	.537	.600	.625	.700	.718	.600	.612
.900	.906 TYPE (ITYPCH	1.00	1.00 4				
	PLANT RATED		=	1.000000E	-10		
	PLANT RATED			0.000000E+			
	PLANT PART I						
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTIT DOOR AND				VENT AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	0.	GAIN	2.	0.	0.	0.	0.	0.	0.	0.
	-1111.	LOSS		-42.	-14.	0.	-18.	-1.	-1075.	0.
FEB	0.						0.			0.
	-901.	LOSS		-34.	-12.	0.	-12.	-1.	-878.	0.
142.5	•	G3 T11	_		_	_				
MAR	0.		2.		0.		1.			0.
	-874.	LUSS		-31.	-11.	0.	-9.	-1.	-864.	0.
APR	0.	GATN	2	0.	0.	0	2.	0	4	0.
•••	-403.			-16.					-421.	0.
		2000		20.	٥.	٥.			721.	0.
MAY	0.	GAIN	2.		0.	0.	5.	0.	5.	0.
	-182.	LOSS		-7.	-3.	0.	0.	0.	5. -221.	0.
	.00	GAIN	2.41	1.86	.14	.00	7.42	.01	7.11	.00
	-23.28	LOSS		-2.33	-1.50	.00	.00	12 -	-72.15	.00
T T T T	.00	CATA	2 42	2 24	20	0.0	7 50	00		2.2
001	-12.53		2.43		-1.43		7.59	.02 12 -		.00 .00
	12.55	1033		-2.23	-1.43	.00	.00	12 -	- 70.06	.00
AUG	.00	GAIN	2.11	1.62	.23	.00	6.82	.02	11.72	.00
	-10.33	LOSS		-2.30	-1.37	.00	6.82	11 -	-65.53	.00
	0.		2.	0.	0.	0.	4.	0.	10.	0.
	-131.	LOSS		-7.	-3.	0.	-1.	0.	-171.	0.
o am	•	a	•			_		_		
OCT	0. -401.				0.		1.			
	-401.	LUSS		-18.	-6.	0.	-4.	0.	-41/.	0.
NOV	0.	GAIN	1.	0.	0.	0.	0.	0.	1.	0.
	-676.			-28.	-9.	0.	-9.	-1.	-669.	0.
	0.		1.	0.	0.	0.	0.	0.	0.	0.
	-1088.	LOSS		-41.	-13.	0.	-17.	-1	1055.	0.
mom	•	01 T 11		_	_			_		
							36.			0.
	-5813.	LOSS		-231.	-81.	υ.	-75.	-7	5979.	0.
MAX	HEATING	LOAD=	-2376	820. B	TUH ON 1	DEC 28	HOUR 9	AMRT	ЕИТ ТЕМІ	21
MAX	COOLING	LOAD=	2370	0. B	TUH ON I	DEC 31	HOUR 9 HOUR 24	AMRT	ENT TEM	2 42
·				-						

ZONE UA BTU/HR-F 2779.1

BEACON Energy Analysis By EMC Engineers, Inc. 826RGD.I

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

					FAN	TOTAL
INTERNAL						
INTERNAL S	SPACE	COIN-	LIGHTING	PROCESS	HEAT	HEAT

	INTERNAL TEMPERA				COIN- CIDENT		PROCESS MILLION		HEAT GAIN MILLION
MONTH	AVG. MAX	MIN	DAY	HR	AMBT.	KWH	BTU	BTU	BTU
JAN	66. 68	28.	4 29		63. 10.	4.16	11.89	9.24	38.27
FEB	66. 69	39.	13 19		68. 7 13.	3.76	10.74	8.35	34.57
MAR	67. 78	52.	28 14			4.16	11.89	8.92	37.95
APR	69. 86	67.	30 9		84.	4.03	11.51	8.32	36.41
MAY	72. 88	67.	29 11			4.16	11.89	7.40	36.43
JUN	76. 92	68.	30 18			4.03	11.51	6.46	34.55
JUL	80. 100	68.				4.16	11.89	6.61	35.64
AUG	78. 98	68.	29 6		96. 69.	4.16	11.89	7.03	36.06
SEP	74. 96	68.	2 10		91. 69.	4.03	11.51	6.61	34.70
OCT	69. 86	67.	1 10			4.16	11.89	8.26	37.29
NOV	68. 79	56.	8 2			4.03	11.51		
DEC	65. 70	9.	23 18		67. -1.	4.16	11.89	9.17	38.20
YEAR						48.98	140.03	95.11	436.88

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER C	F HOURS WH	EN MAXIMUM	LOADS
		INCLUDING	LOADS W	VERE NOT ME	T BTU	J
MONTH	HEATING	ECONOMIZER	HEATING	G COOLING	HEATING	COOLING
JAN	744	0	158	0	2377E+07	.0000
FEB	671	0	131	0	2377E+07	.0000
MAR	699	0	81	0	2377E+07	.0000
APR	533	0	0	0	2366E+07	.0000
MAY	398	0	0	0	1775E+07	.0000
JUN	146	0	0	0	6395E+06	.0000
JUL	77	0	0	0	5790E+06	.0000
AUG	72	0	0	0	4684E+06	.0000
SEP	272	0	0	0	1379E+07	.0000
OCT	552	0	0	0	2066E+07	.0000
NOV	666	0	39	0	2377E+07	.0000
DEC	738	0	205	0	2377E+07	.0000
YEAR	5568	0	614	0	2377E+07	.0000

BEACON Energy Analysis By EMC Engineers, Inc. 826RGD.I

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	1464.49	.00	4.16	11.89	2.71	38.27	12.1
FEB	1211.29	.00	3.76	10.74	2.45	34.57	12.1
MAR	1194.37	.00	4.16	11.89	2.61	37.95	12.1
APR	624.18	.00	4.03	11.51	2.44	36.41	12.1
MAY	338.60	.00	4.16	11.89	2.17	36.43	12.1
JUN	87.74	.00	4.03	11.51	1.89	34.55	12.1
JUL	46.66	.00	4.16	11.89	1.94	35.64	12.1
AUG	42.61	.00	4.16	11.89	2.06	36.06	12.1
SEP	241.89	.00	4.03	11.51	1.94	34.70	12.1
OCT	628.61	.00	4.16	11.89	2.42	37.29	12.1
NOV	970.77	.00	4.03	11.51	2.56	36.82	12.1
DEC	1446.04	.00	4.16	11.89	2.69	38.20	12.1
YEAR	8297.25	.00	48.98	140.03	27.87	436.88	12.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 438774. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc.

826RGD.I

BLDG 826 - GYMNASIUM - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

				OTH	ER MONT	HLY S	TATIST	ICS		
	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. I DEG +	DRIFT		S WHEN 1 LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	
JAN	1041.	675.	1.000	35.	0.	0.	0	158	.0000	2377E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	131	.0000	2377E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	81	.0000	2377E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	2366E+07
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.0000	1775E+07
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	6395E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	5790E+06
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	4684E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	1379E+07
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	2066E+07
NOV	1039.	732.	1.000	47.	0.	0.	0	39	.0000	2377E+07
DEC	883.	604.	1.000	35.	0.	0.	0	205	.0000	2377E+07

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings
Location: Fort Leonard Wood, Missouri

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORMAT	ION:							
Building No: 82	6	Building Na	me: Gymnasi	ım				
Surveyed by: DM	S	Date:	11/6/95		Building Use:	Physical Fitnes	ss	
Building Contact:					Phone No:			
Building Contact:					Phone No:			
OCCUPANCY:								
Number of Employees:	Mon./Fri.:	5		Schedule:	530	То	2000	
	Tues./Thurs	5			530	То	2000	
	Wed.	5			530	То	2000	•
	Sat./Sun.	3			1300	То	1600	
Visitors Per Day:	Mon./Fri.:		200	Schedule:	530	То	2000	
	Tues./Thurs		200		530	То	2000	
	Wed.		200		430	То	2000	
	Sat./Sun.		200		1300	То	2000	
Comments:								
LIGHTING SCHEDULE	•							
Normal Occupancy:	MonFri.:			Schedule:	530	То	2000	
	Sat./Sun.:				1300	То	2000	
Cleaning Crew/2nd Shif	t: MonFri.:			Schedule:		То		
	Sat./Sun.:					То		
EQUIPMENT SCHEDU	LE:							
Fan/AHU Schedule:	MonFri.:			Schedule:	0	То	2400	
	Sat./Sun.:				0	То	2400	
Chiller Schedule:	MonFri.:			Schedule:		То		
	Sat./Sun.:					То		
Boiler Schedule:	MonFri.:			Schedule:		То		
	Sat./Sun.:					То		
Aux. Equipment Schedu	le:							
Domestic HW	MonFri.:			Schedule:	0	То	2400	
	Sat./Sun.:				0	То	24 00	
	MonFri.:			Schedule:		То		
	Sat./Sun.:					То		
Comments:								

E M C Engineers, Inc.
Project Name: Limited Energy Study, Insulating Brick Buildings
Location: Fort Leonard Wood, Missouri

Building No 826

Building Name: Gymnasium

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING ENVELOPE

	1	EXTERIOR WALLS	L	IST OF EXT. WALL CONSTRUCTION TYPES
Wall				
,	Wall Construction		Wall Construction	
E, W, or S)	No.	Comments	No.	Description
N	XW-1,-5		XW-I	Face Brick & CMU
E	XW-1,-5		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-1,-5		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-1,-5		XW-4	Face Brick, CMU, & Plaster Coat
1		GENERAL: Face Brick & CMU 12' A.F.F.,	XW-5	Insulated Metal Panel
		then insulated metal panel to roof		
		(In Gymnasium Area)		
		WINDOWS		LIST OF WINDOW TYPES
Window Direction (N E, W, or S)	Window Construction No.	Comments	Window Construction No.	Description
N		All windows are now covered with insulated	W-I	Double Pane Clear
E		metal panels.	W-2	Double Pane Tinted
S			W-3	Single Pane with Storm Windows
W			W-4	Single Pane
	RO	OF CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
Roof	Roof		Roof Construction	
Location	Construction No.	Comments	No.	Description
ALL	R-7		R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
			R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceilin Tile
			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
			R-4	BUR; Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plast Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceilin Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaste Cig.
			R-7	BUR, Rigid Insul., Poured Gypsum Deck, I" Form Board

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 826 Building Name: Gymnasium

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

			UIPMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall Direction (N, E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
L, 11, 0. 0)					Architectural
O A	·····			A-1	Interior Partitions
Gym Area		1	Bleachers are 15' high A.F.F.	A-2	Wood Wall
N	A-5 E-3	1	Diedoliels die 10 high v. a.	A-3	Drapery Valances
N N		1	Glazed structural block 5' A.F.F. in toilet room	A-4	Drapery Rods
N	A-7		Glazed Structural block of A.F. II. III tollock oom	A-5	Bleachers
N	M-6	1 1	Wood (maple) walls & floor in raquetball court	A-6	Lockers
N	A-2		Walls & floor in raquellatin coart	1	
s	A-6	1	Glazed structural block 4'-0" A.F.F. in locker rooms	A-7	Mirror
S	M-4	2		A-8	Score board
<u> </u>	M-3	2		A-9	Basketball backboard and rim
S	E-4	1		A-10	Speakers
s	E-2	1			Plumbing
S	A-8	1		P-I	Sinks
S	A-0 A-9	- 2		P-2	Commodes
S	A-10	2		P-3	Toilet Stalls
S	E-6	2		P-4	Water Fountains
				-1	
W	E-5	1			HVAC Mechanical
W	E-4	 		M-I	Floor Supply/Return Grilles
W	E-3	1 1		M-2	Ceiling Supply/Return Grilles
W	E-3	1 1		M-3	Finned-Tube Baseboard Radiators
W	E-6	 		M-4	Thermostats / Space Temp. Sensors
VV				M-5	Wall mounted convection type heater
E	L-3	1		M-6	Fan Coil
E	E-6	1 - 2			Electrical
		- -		E-I	Electrical Panels
S	E-5	1		E-2	Electrical Outlets
S	E-6	1 1		E-3	Electrical Light Switches
S	F-4	1		E-4	Electrican Conduit
	<u> </u>	 		E-5	Emergency light
		-		E-6	Electrical Disconnect
			GENERAL: Concrete block 10' A.F.F. in basketball		Lighting
	<u> </u>			_ 	Wall Mounted Fixtures
			court area		Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
	<u> </u>				Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
<u> </u>				F-3	Sprinkler Heads
 	<u> </u>		<u> </u>		Fire Extinguishes
		 			
 	1 -	_			Communication
	 			C-1	Telephones - Wall Mounted
 	1			C-2	Telephones - Booth Mounted
	<u> </u>			(-3	Telephone Jacks
l	1				

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

Feb-96

PREPARED BY:

EMC NO.: 1406-011

DMS

CHECKED BY: FILE:

DATE:

AJN 826HV1

	BLDG:	826	FILE:	826HV1
	AIR HANDLING UNI	T SURVEY OBSE	RVATIONS	
HV-1	AHU NO.	MAIN GYM SE		LOCATION (RM)
	REF. SYS. SERVING AHU		MAIN GYM	SERVES AREA

		UNIT TYP	E:			
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&∨	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
NUMBER OF ZONE	S	OTHER				
COMMENT:						

				NAMEPL	ATE:				
	,			MFG.					MODEL
1.5	SUPPLY FAN HP			MFG.					MODEL
	RET/EXH FAN HP			MFG.					MODEL
8500	CFM-HTG	CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA	SERVED
COMMENT	T: UN	IT NOT ACCESSIBLE EX	CEPT BY	A VERY TALL L	ADDER				

				COILS:				
х	NONE		STM	нw	ELEC		MOD VLV	PREHEAT
	NONE	x	STM	HW	ELEC	х	MOD VLV	HEATING
x	NONE		STM	нw	ELEC		MOD VLV	REHEAT
х	NONE		STM	HW	EVAP MEDIA		MOD VLV	HUMID.
х	NONE		DX	cw			MOD VLV	COOLING

			. , , ,		OPERAT	ION:					
HOURS (ON:		S	М	Т	w	Т	F	s	COMMENTS	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	ON:										
J	F	М	А	М	J	J	A	s	0	N	Ð
1	1	1	1	1	1	1	1	1	1	1	1

				CONTRO	LS:			
	х	PNEUMATIC		ELECTRIC		ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL	UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR	OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Υ	RA (Y/N)	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT	OTHER	
DEMAND LIMIT:		YES	х	NO				
COMMENTS:	T-STAT CO	OVERS LOCKED						

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

826

EMC NO.: 1406-011

DATE:

Feb-96 **DMS**

PREPARED BY: CHECKED BY:

AJN

FILE: 826HV2

	AIR HANDLING UNIT	SURVEY OBSERVATIONS	
HV-2	AHU NO.	MAIN GYM SW	LOCATION (RM)
	REF. SYS. SERVING AHU	MAIN GYM	SERVES AREA

		UNIT TYP	E:			
 SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&V	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
 NUMBER OF ZONES		OTHER				
COMMENT:		· · · · · · · · · · · · · · · · · · ·				

				NAMEPL	ATE:		*		
				MFG.			1777		MODEL
1.5	SUPPLY FAN HP			MFG.				**	MODEL
	RET/EXH FAN HP			MFG.					MODEL
8500	CFM-HTG	CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA	
COMMENT	: UNIT	NOT ACCESSIBLE EX	CEPT BY	VERY TALL LA	ADDER	<u> </u>			

				COILS:				
X	NONE		STM	HW	ELEC		MOD VLV	PREHEAT
	NONE	х	STM	HW	ELEC	×	MOD VLV	HEATING
х	NONE		STM	HW	ELEC		MOD VLV	REHEAT
х	NONE		STM	HW	EVAP MEDIA		MOD VLV	нимір.
x	NONE		DX	cw			MOD VLV	COOLING

			OPERAT	ION:					
HOURS ON:	s	М	T	w	т	F	s	COMMENTS	· · · · · · · · · · · · · · · · · · ·
PRESENT START TIME		0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED START TIME									
REQUIRED STOP TIME									
MONTHS ON:			<u> </u>					L.,	
J F 1	A A	М	j	J	Α	s	0	N	D
1 1	1 1	1	1	1	1	1	1	1	1

				CONTRO	LS:			
	x	PNEUMATIC		ELECTRIC		ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL	UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR	OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT	OTHER	
DEMAND LIMIT:		YES	х	NO				
COMMENTS:	T-STAT CO	OVERS LOCKED			••••••			<u> </u>

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96

DMS AJN

CHECKED BY: FILE:

826HV3

	AIR HANDLING UNIT	SURVEY OBSERVATIONS	
HV-3	AHU NO.	MAIN GYM NE	LOCATION (RM)
	REF. SYS. SERVING AHU	MAIN GYM	SERVES AREA

826

BLDG:

		UNIT TYP	E:			
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&V	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
NUMBER OF ZONES		OTHER				
COMMENT:	-					

				MFG.					MODEL
1.5	SUPPLY FAN HP			MFG.					MODEL
	RET/EXH FAN HP			MFG.					MODEL
8500	CFM-HTG	CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA	SERVED

				COILS:				
х	NONE	T	STM	HW	ELEC		MOD VLV	PREHEAT
	NONE	х	STM	HW	ELEC	х	MOD VLV	HEATING
х	NONE		STM	нw	ELEC		MOD VLV	REHEAT
х	NONE		STM	HW	EVAP MEDIA		MOD VLV	HUMID.
×	NONE		DX	cw			MOD VLV	COOLING

					OPERAT	ION:					
HOURS (ON:		s	М	Т	w	T	F	s	COMMENTS	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	S ON:										
J	F	М	Α	М	J	J	Α	s	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

				CONTRO	LS:			
	х	PNEUMATIC		ELECTRIC		ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL	UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR	OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Y	RA (Y/N)	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT	OTHER	
DEMAND LIMIT:		YES	х	NO				
COMMENTS:	T-STAT C	OVERS LOCKED						

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY:

AJN

	BLDG:	826	FILE:	826HV4
	AIR HANDLING UNIT	T SURVEY OBSE	RVATIONS	
HV-4	AHU NO.	MAIN GYM NY	y	LOCATION (RM)
	REF. SYS. SERVING AHU		MAIN GYM	SERVES AREA

		UNIT TYP	E:			
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&V	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
NUMBER OF ZONE	s	OTHER				
COMMENT:						

				NAMEPL	ATE:				
				MFG.					MODEL
1.5	SUPPLY FAN HP			MFG.					MODEL
	RET/EXH FAN HP			MFG.					MODEL
8500	CFM-HTG	CFM-CLG	0%	MIN %OA	100%	MAX %OA	20.0%	% HTG AREA	SERVED
COMMENT	T: UNIT	NOT ACCESSIBLE EX	CEPT BY	A VERY TALL LA	ADDER				

				COILS:				
х	NONE		STM	нw	ELEC		MOD VLV	PREHEAT
	NONE	x	STM	HW	ELEC	х	MOD VLV	HEATING
х	NONE		STM	нw	ELEC		MOD VLV	REHEAT
X	NONE		STM	нw	EVAP MEDIA		MOD VLV	HUMID.
Х	NONE		DX	cw			MOD VLV	COOLING

				C	PERATI	ON:					
HOURS C	ON:		s	м	т	w	т	F	s	COMMENTS	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	70.4
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	ON:				· · · · · · · · · · · · · · · · · · ·	<u>_</u>					
J	F	м	А	м	J	J	Α	s	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

				CONTRO	LS:			
	х	PNEUMATIC		ELECTRIC		ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		
SPACE SETPOINT (°F):	69	OCC HEAT		UNOCC HEAT		OCC COOL	UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR	OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Y	RA (Y/N)	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT	OTHER	
DEMAND LIMIT:		YES	х	NO				
COMMENTS:	T-STAT CO	OVERS LOCKED						J

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

BLDG:

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY: FILE:

AJN **826HV5**

	AIR HANDLING UNIT SURVEY OBSERVATIONS												
HV-5	AHU NO.	EXERCISE RM.	LOCATION (RM)										
	REF. SYS. SERVING AHU	EXERCISE RM. / HANDBALL	SERVES AREA										

826

		UNIT TYP	E:			
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	х	H&V	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION		VAV	
NUMBER OF ZONE	S	OTHER				
COMMENT:	,,,					

				NAMEPL	ATE:				
				MFG.					MODEL
1.5	SUPPLY FAN HP			MFG.				11112	MODEL
	RET/EXH FAN HP			MFG.					MODEL
8500	CFM-HTG	CFM-CLG	0%	MIN %OA	100% MA	X %OA	20.0%	% HTG AREA	SERVED
COMMENT	: UNIT	NOT ACCESSIBLE EX	CEPT BY	A VERY TALL LA	ADDER			<u> </u>	

				COILS:				
х	NONE		STM	нw	ELEC		MOD VLV	PREHEAT
	NONE	x	STM	HW	ELEC	х	MOD VLV	HEATING
х	NONE		STM	HW	ELEC	7	MOD VLV	REHEAT
х	NONE		STM	HW	EVAP MEDIA		MOD VLV	HUMID.
х	NONE		DX	cw			MOD VLV	COOLING

				C	PERATI	ON:					
HOURS	ON:		S	М	Т	w	т	F	s	COMMENTS	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	- ***
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED	START TIME										
REQUIRED	STOP TIME										···
MONTH	ON:									<u> </u>	
J	F	M	Α	м	J	J	Α	s	0	N	D
1	1	1	1	1	1	1	1	1	1	1	1

				CONTRO	LS:			
	×	PNEUMATIC		ELECTRIC		ELEC'NIC	DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		· · · · · · · · · · · · · · · · · · ·
SPACE SETPOINT (°F):	72	OCC HEAT		UNOCC HEAT		OCC COOL	UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR	OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Υ	RA (Y/N)	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT	OTHER	
DEMAND LIMIT:		YES	×	NO				

ANNUAL ENERGY SAVINGS SUMMARY FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
655	0.00	0.00	0.00	11.30	11.30	0.00	918.05	795.66	122.39

SIMILAR BUILDINGS

				11	1	I		1	
İ					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
1		:	Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 655	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
626	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
633	12,134	12,134	1.000	0.00	0.00	0.00	0.00	122.39	122.39
656	12,134	12,134	1.000	0.00	0.00	0.00	0.00	122.39	122.39
733	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
734	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
<i>7</i> 51	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
752	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
823	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
824	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
840	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
841	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
1006	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
1007	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
1025	12,155	12,134	1.002	0.00	0.00	0.00	0.00	122.39	122.60
	*T		-						

^{*}Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak			Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
655	0.00	0.00	0.00	11.30	11.30	0.00	918.05	790.16	127.89

SIMILAR BUILDINGS

,					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 655	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
626	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
633	12,134	12,134	1.000	0.00	0.00	0.00	0.00	127.89	127.89
656	12,134	12,134	1.000	0.00	0.00	0.00	0.00	127.89	127.89
733	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
734	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
<i>7</i> 51	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
752	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
823	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
824	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
840	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
841	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
1006	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
1007	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11
1025	12,155	12,134	1.002	0.00	0.00	0.00	0.00	127.89	128.11

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
655	\$50,994

SIMILAR BUILDINGS

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 655	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
626	12,155	12,134	1.002	\$50,994	\$51,082
633	12,134	12,134	1.000	\$50,994	\$50,994
656	12,134	12,134	1.000	\$50,994	\$50,994
733	12,155	12,134	1.002	\$50,994	\$51,082
734	12,155	12,134	1.002	\$50,994	\$51,082
<i>7</i> 51	12,155	12,134	1.002	\$50,994	\$51,082
<i>7</i> 52	12,155	12,134	1.002	\$50,994	\$51,082
823	12,155	12,134	1.002	\$50,994	\$51,082
824	12,155	12,134	1.002	\$50,994	\$51,082
840	12,154	12,134	1.002	\$50,994	\$51,078
841	12,155	12,134	1.002	\$50,994	\$51,082
1006	12,155	12,134	1.002	\$50,994	\$51,082
1007	12,155	12,134	1.002	\$50,994	\$51,082
1025	12,155	12,134	1.002	\$50,994	\$51,082

^{*}Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY FOR ADMINISTRATION/SUPPLY BUILDINGS - BLDGS 626, 633, 655, 656, 733, 734, 751, 752, 823, 824, 840, 841, 1006, 1007, & 1025

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
655	\$52,484

SIMILAR BUILDINGS

		T			
	}		Square	Į	
1	ļ		Foot		
ŀ		Building	Adjust-		Adjusted
Building	Building	No. 655	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
626	12,155	12,134	1.002	\$52,484	\$52,575
633	12,134	12,134	1.000	\$52,484	\$52,484
656	12,134	12,134	1.000	\$52,484	\$52,484
733	12,155	12,134	1.002	\$52,484	\$52,575
734	12,155	12,134	1.002	\$52,484	\$52,575
<i>7</i> 51	12,155	12,134	1.002	\$52,484	\$52,575
752	12,155	12,134	1.002	\$52,484	\$52,575
823	12,155	12,134	1.002	\$52,484	\$52,575
824	12,155	12,134	1.002	\$52,484	\$52,575
840	12,155	12,134	1.002	\$52,484	\$52,575
841	12,155	12,134	1.002	\$52,484	\$52,575
1006	12,155	12,134	1.002	\$52,484	\$52,575
1007	12,155	12,134	1.002	\$52,484	\$52,575
1025	12,155	12,134	1.002	\$52,484	\$52 <i>,</i> 575

^{*}Investment Cost prorated on a square foot basis

				E COST ANALYSIS			
		ENER	GY CONSER	VATION INVESTMEN	IT PROGRAM (ECIP)	
	LOCATION	5		DECISIO - 1111			
	LOCATION:	Fort Leonard		REGION: 2 (Misson	•	PROJECT NO:	1406-011
	PROJECT TITLE		rgy Study, In:	sulate Brick Building		FISCAL YEAR:	1996
	ANALYSIS DAT	E: 02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1. 1	INVESTMENT:	BLDG 655 -	INSTALL 3.5	" BATT INSULATIO	N ON WALLS		
,	A. CONSTRUCTION	N COST	=	:		\$45,127	
	B. SIOH COST	(7.	0% of 1A) =	:		\$3,159	
(C. DESIGN COST	(6.	0% of 1A) =	:		\$2,708	
ľ	D. TOTAL COST	(1A	+1B +1C) =			\$50,994	
E	E. SALVAGE VALU	E OF EXISTING EC	UIPMENT =			\$0	
F	F. PUBLIC UTILITY	COMPANY REBAT	Έ =			\$0	
C	G. TOTAL INVESTM	MENT (1	D -1E -1F) =			>	\$50,994
2 6	ENERGY SAVINGS /	OP COST ().					
	ENERGY SAVINGS (+ DATE OF NISTIR 85-3	-	R DISCOUNT	FACTORS:	JAN '96		
	ENERGY	FUEL COS	SAVINGS		DISCOUNT	DISCOUNTED	
	SOURCE		MBTU/YR (2)		FACTOR (4)		
Δ	A. ELECT.	\$7.33	0	• •	15.88	\$0	
В	3. DIST	\$0.00	0	\$0	10.00	\$0	
c	C. NAT GAS	\$5.30	122.39	\$649	18.30		
D	D. COAL	\$0.00	0	\$0		\$0	
E	E. ELEC. DEMAND			\$0	13.47	\$0	
F	TOTAL		122.39	\$649		>	\$11,871
3. N	ION-ENERGY SAVING	GS (+) OR COST (•)				
Α	A. ANNUAL RECUR	RING (+/-)					
	1 ANNUAL MAIR	NTENANCE		\$ 0		\$0	
	2			\$0		\$0	
	3			\$ 0		\$O	
	4 TOTAL ANNUA	AL DISC. SAVINGS	(+) / COST	\$0		\$0	
В	. NON-RECURRING	i (+/-)					
	ITÉM	:	SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
		C	OST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)	
					(TABLE A-2)		
	a. BASELINE EQU	IP. REPLCMNT.				\$ O	
	b.					\$0	
	c.					\$0	
	d.					\$0	
	e.					\$0	
	f. TOTAL		\$0			\$0	
C.	. TOTAL NON-ENE	RGY DISCOUNTED	SAVINGS (+	-) OR COST (-)	(3A4 + 3Bf4) =		\$0
, FI	IRST YEAR DOLLAR	SAVINGS (±\ / CO	STS (-)	,,)E2 ± 2 A A ± (2D£4 /F)	nonomie Life	10.0
	IMPLE PAYBACK (SP				2F3 + 3A4 + (3Bf1/E	conomic Lite))	\$649
	OTAL NET DISCOUN		., DL \ 10 f	LANS TO QUALIFY)			78.61
	ISCOUNTED SAVING		T RATIO ISID	1	(2F5 + 3C) =		\$11,871
	(MUST HAVE SID			1	(6/1G) =		0.23

(MUST HAVE SIR > 1.25 TO QUALIFY)

PREPARED 18-Feb. ATOR D. Sin KED BY A. Nieme LABOR COST Hours/ S1,040	FNGI	EEK'S C	ENGINEER'S OPINION OF PROBABLE COST					SHEET	+	2	
Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Being Bein	PROJEC	L	Limited Energy Study, Insulate Brick Buildings, Fort L	eonard Woo	od, MO			DATE PRE	PAREN	- 1	- John Oc
Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part Part	ENGINE	#	E M C Engineers, Inc.					ESTIMATO	R R	9	Sinz
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BUILDING 6535 Tribin Tri	i	Item Refer			MA	TERIAL CO	ST	L	ABOR COS		
BUIDING 655 NOTICE SECTION STATE SECTION STATE SECTION STATE SECTION STATE SECTION	No.	Code		Unit of Measure	Oriantity	Cost		Crew/	Hours/	- -	İ
13-172 INSTALL 3-172 BATT INSULATION ON WALLS 15-172 INSTALL 3-172 BATT INSULATION ON WALLS 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSTALL 3-172 BATT INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSULATION 15-172 INSUL	1		BUILDING 655		and mily	1600	-014	vvorker	Onit	otal	TOTAL
13-12 NSTALL 3-12" BATTI NSULATION S.F. 6654 0 \$0.018 \$11,025 1-CARP 0.007 \$1,040 10	2		INSTALL 3.5" BATT INSULATION ON WALLS								
13-1/2 INSTALL 3-1/2" BATTI INSULATION S.F. 56640 \$0.018 \$1,1026 1-CARP 0.007 \$1,040 10	e -										
NSTALL 12'PEWALL 1'APED & SANDED S.F. 65840 \$9.03 \$1.130 \$1.42RP 0.007 \$1.040	4 10	12.1/01	INSTALL 3 412" DATT INC. II ATICAL								
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TCP INSTALL TWO COATS OF PAINT ON DRYWALL ST. 5654 St. 136 F. 2 0.009 \$2.391 RIZWMH RELOCATE ELECTRICAL UGHT SWITCH E.A. 25.0 \$18.39 \$460 0.01 \$1.365 RED RELOCATE ELECTRICAL UGHT SWITCH E.A. 15.0 \$18.30 \$1.146 0.04 \$1.146 RAT RELOCATE ELECTRICAL UGHT SWITCH E.A. 15.0 \$1.14 \$306 1.5AP \$1.12 0.044 \$1.12 RAT RELOCATE ELECTRICAL UGHT SWITCH E.A. 15.0 \$1.14 \$306 1.5AP \$1.146 RAT RELOCATE ELECTRICAL UGHT SWITCH E.A. 15.0 \$1.14 \$306 \$1.14 \$306 \$1.14 \$1.12 RAT RELOCATE ELECTRICAL UGHT SWITCH E.A. 7 FROM WAIL L.F. 266.0 \$1.14 \$306 \$1.14 \$1.12 \$1.13 RAPPL RELOCATE ELECTRICAL UGHT SWITCH E.A. 7 FROM WAIL L.F. 266.0 \$1.14 \$306 \$1.14 \$1.12 RAPPL RELOCATE ELECTRICAL UGHT SWITCH E.A. 7 FROM WAIL L.F. 266.0 \$1.14 \$306 \$1.14 \$1.12 RAPPL RELOCATE ELECTRICAL UGHT SWITCH E.A. 7 FROM WAIL L.F. 266.0 \$1.14 \$306 \$1.14 \$1.12 RAPPL RELOCATE ELECTRICAL UGHT SWITCH E.A. 7 FROM WAIL L.F. 266.0 \$1.14 \$306 \$1.14 \$1.12 RAPPL RELOCATE FIRE EXTINGUISHER E.A. 10.0 \$0.0 \$0 \$1.14 \$1.14 REPORT FIRE EXTINGUISHER E.A. 10.0 \$1.14 \$1.14 SUBTOTAL E.A. 10.0 \$1.14 \$1.14 SUBTOTAL CONTINGENCY \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 SUBTOTAL COST TOTAL COST \$1.14 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17 \$1.17 \$1.17 CONTINGENCY \$1.17	0 1	No.	INSTALL 1/2 UNIVALL - IAPED & SANDED	S.F.	5654.0	\$0.20	\$1,133	2-CARP	0.017	\$5,051	\$6,183
RELOCATE LICETRIAL OWN STANDARD STANDARD STANDARD STANDARD S18.365 S10.00 S13.65	. 0	TCP	INSTALL 2 A4 STODDED WALL 2 OC		4821.0	\$0.24	\$1,136	F-2	0.00	\$2,391	\$3,527
RELS RELOCATE ELECTRICAL LIGHT SWITCH EA 25.0 \$18.39 \$460 Q.65 \$5.5 \$11.480 \$11.480 \$1.5 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.1480 \$1.	6	R12WMH	RELOCATE 12' BASEBOARD BADIAT	Y.Y.	5654.0	\$0.07	\$378	1-PORD	0.01	\$1,365	\$1,742
RED RED STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE STATE	9	REIS	RELOCATE EL ECTRICAL LICHT SALIT	ĽĄ.	25.0	\$18.39	\$460	9-0	5.25	\$11,480	\$11,940
RAT RELOCATE CELLING TILE 4-0° FROM WALL L. F. 266.0 \$7.97 \$114 1-ELEC 0.896 \$409 \$409 \$114 \$100 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104 \$104	-	REO		ė į	3.0	\$8.82	\$26	1-ELEC	0.844	\$77	\$104
RDR RELOCATE DIAGNERIES, WINDOW SIADES E.A. 15.0 \$0.00 \$0 L.CARP 0.134 \$936 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CARP 0.154 C.CA	12	RAT	DELOCATE CELLO TIL E 41 011 FDC 11 11	EA.	15.0	\$7.97	\$119	1-ELEC	0.896	\$409	\$529
RWPL RELOCATE FIRE EXTINGUISHER EA 15.0 \$0.00 \$0 L-Z 0.744 \$516	1.2	RNR	RELOCATE OCICING LICE - 4 -0 FROM WALL	ו ני	266.0	\$1.14	\$305	1-CARP	0.134	\$936	\$1,241
Name	2 5		DELOCATE URAPERIES, WINDOW SHADES	EA.	15.0	\$0.00	\$0	L-2	0.744	\$518	\$518
SUBTOTAL NEUCATIE FIRE EXTINGUISHER EA 50 \$0.00 \$0 1-CARP 0.2 \$26	ָד ה	אאר ר	RELOCATE WALL PLACARD	EA.	10.0	\$0.00	\$0	1-CARP	0.654	\$172	\$172
SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBSTITUTE SUBSTITUTE SUBTOTAL SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUTE SUBSTITUT	5 6	2	NELOCATE PIRE EXTINGUISHER	EA.	5.0	\$0.00	\$0	1-CARP	0.2	\$26	\$26
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PRO PROFIT \$5.86 \$28,827 SUBTOTAL \$5.896 \$31,710 CONT CONTINGENCY \$6,342 TOTAL COST \$7,076 \$38,052	31		SUBTOTAL			0/ /-	8774			\$4,189	\$4,967
SUBTOTAL \$5.896 \$2,883 CONT CONTINGENCY \$6,342 TOTAL COST \$7,076 \$38,052	32	PRO	PROFIT			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	095,54			\$28,827	\$34,187
CONT \$0,896 \$31,710 TOTAL COST \$7,076 \$38,052	33		SUBTOTAL		!	%0L	\$536			\$2,883	\$3,419
TOTAL COST \$7,076 \$38,052	34	CONT	CONTINGENCY				\$5,896			\$31,710	\$37,606
\$7,076	32		18			20%	\$1,179			\$6,342	\$7,521
							\$7,078			\$38,052	\$45,127

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) 1406-011 REGION: 2 (Missouri) PROJECT NO: Fort Leonard Wood LOCATION: FISCAL YEAR: 1996 Limited Energy Study, Insulate Brick Buildings PROJECT TITLE: D. Sinz PREPARED BY: **ECONOMIC LIFE:** 20 ANALYSIS DATE: 02/18/96 BLDG 655 - INSTALL 1.5" RIGID INSULATION ON WALLS 1. INVESTMENT: \$46,446 A. CONSTRUCTION COST \$3,251 (7.0% of 1A) =B. SIOH COST \$2,787 C. DESIGN COST (6.0% of 1A) =\$52,484 D. TOTAL COST (1A + 1B + 1C) =\$0 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 F. PUBLIC UTILITY COMPANY REBATE = \$52,484 ----> G. TOTAL INVESTMENT (1D - 1E - 1F) =2. ENERGY SAVINGS (+) OR COST (-): **JAN '96** DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: DISCOUNT DISCOUNTED **FUEL COS SAVINGS** ANNUAL \$ **ENERGY** SAVINGS (5) \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SOURCE \$0 13.80 \$0 A. ELECT. \$7.33 \$0 0.00 \$0.00 0 \$0 B. DIST \$12,038 17.76 \$678 C. NAT GAS \$5.30 127.89 ŝO \$0 0.00 \$0.00 0 D. COAL ŝO \$0 13.47 E. ELEC. DEMAND ----> \$12,038 \$678 127.89 TOTAL NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) \$0 \$0 1 ANNUAL MAINTENANCE \$0 \$0 2 \$0 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST ŝΩ B. NON-RECURRING (+/-) DISCOUNTED DISCOUNT SAVINGS (+) YEAR OF ITEM FACTOR (3) SAVINGS/COST (4) COST(-) (1) OCCURRENCE (2) (TABLE A-2) \$0 a. BASELINE EQUIP. REPLCMNT. \$0 \$0 C. \$0 d. \$0 e. \$0 ŝO f. TOTAL \$0 (3A4 + 3Bf4) =C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) \$678 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) (2F3+3A4+(3Bf1/Economic Life)) 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) 77.43 (1G/4) =(2F5 + 3C) =\$12,038 6. TOTAL NET DISCOUNTED SAVINGS 0.23 (6/1G) =

LIFE CYCLE COST ANALYSIS SUMMARY

 DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (MUST HAVE SIR > 1.25 TO QUALIFY)

PROJECT Limited Energy	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO E M C Engineers, Inc. Denver, CO Item Description Measure Quant Mult of Measure Quant Not to Guant Measure Quant Not to Guant Not to Guant Measure Quant Not to Guant Not to Guant Measure Quant Not to Guant Measure Quant Not to Guant Not to Guant Measure Quant Not to Guant Not to G	eonard Woo	d, MO			DATE PREPARED	PARED	18-	18-Feb-96
tem Refer Code Code I1-1/2RI ID IFS ITCP IFS ITCP IFS ITCP IFS ITCP IFS ITCP IFS ITCP ITCP ITCP ITCP ITCP ITCP ITCP ITCP	rs, Inc. Item Description RIGID INSULATION ON					TANITOT			
Item Refer Code Code II-1/2RI II-1/2RI ITCP ITCP RELS REO RAT RAT RAMPL RAMPL REFE REFE REFE REFE REFE REFE REFE REF	Item Description					ESIIMAIOR	JR.	D	D. Sinz
Code Code II-1/2Ri ID IFS ITCP ITCP RELS REO RAT RDR RWPL RWPL RWPL RWPL RWPL RWPL RWPL RWP	Item Description					СНЕСКЕВ ВУ	ВУ		A. Niemeyer
Code ITCP ITCP ITCP ITCP RELS REO RAT RED RAT REP RWPL RWPL RFE	riem Description	:	MAT	MATERIAL COST)T	1-1	ABOR COS	Ti	
ITCP ITCP ITCP ITCP ITCP ITCP ITCP ITCP	RIGID INSULATION ON	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTA
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IFS ITCP ITCP ITCP ITCP ITCP ITCP ITCP ITCP	NSTALL 1-1/2" RIGID INSULATION	Ω. IT	5654 0	\$0 50	\$3 344	1 CABB	0000	64 400	04 100
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R12WMH RELS REO RAT RODR RWPL RFE	NSTALL 3/4"x2" FURRING STRIPS	L.F.	3204.0	\$0.19	\$611	1-CARP	0.016	\$1347	\$1,058
R12WMH RELS REO RAT RWPL RFE	NSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	5654.0	\$0.07	\$378	1-PORD	0.01	\$1,365	\$1.742
RELS REO RAT RWPL RFE	RELOCATE 12' BASEBOARD RADIATION	EĄ.	25.0	\$18.39	\$460	Q-6	5.25	\$11,480	\$11,940
RAT RDR RWPL RFE	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	3.0	\$8.85	\$26	1-ELEC	0.844	\$77	\$104
RAN RWPL RFE	RELOCATE ELECTRICAL OUTLET	EA.	15.0	\$7.97	\$119	1-ELEC	0.896	\$409	\$529
RWPL RFE	RELOCATE CEILING TILE - 4-0" FROM WALL	L.	266.0	\$1.14	\$305	1-CARP	0.134	\$936	\$1,241
RFE	RELOCATE DRAPERIES, WINDOW SHADES	E	15.0	\$0.00	\$0	L-2	0.744	\$518	\$518
Д	RELOCATE WALL PLACARD	EA.	10.0	\$0.00	\$0	1-CARP	0.654	\$172	\$172
17 18 18	RELOCATE FIRE EXTINGUISHER	Ä	5.0	\$0.00	\$	1-CARP	0.2	\$26	\$26
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	7t				\$6,376			\$22,569	\$28.946
DIFF	TLY FACTOR	:		2%				\$1,128	\$1,128
	7	:	:		\$6,376		The second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second second secon	\$23,698	\$30,074
ᆼ	ΔÞ		:	17%	\$1,084			\$4,029	\$5,113
	7				\$7,460			\$27,727	\$35,187
PRO				10%	\$746		The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	\$2,773	\$3,519
1					\$8,206			\$30,499	\$38,705
34 CONT CONTINGENCY	ENCY			20%	\$1,641			\$6,100	\$7,741
					\$9,847			\$36,599	\$46,446

E M C ENGINEERS	, INC.	•					DATE:	Feb-96
PROJECT: LIMITED ENERGY	STUDY,	INSULATE BRICK	BUILDING	is			BY:	
CLIENT CONTRACT NO.: DA								
							JOB:	1406.011
LOCATION: FT LEONARD W	DOD, M	0.					CHK:	AJI
							FILE:	655BH
Billi	DING I	HEATING LOA	D CALC	III ATIO	N CUEET			
BOIL	DING I	TEATING LOA	D CALC	ULATIO	N SHEET			
BLDG NO:655	_	BLDG NAME:	ADMINIS	TRATION /	SUPPLY			
BLDG FUNCTION:		COMPANY ADM	IINISTRAT	ON / SUPP	LY			
FLOOR AREA: (SQ. FT) SLAB PERIMETER: (FT)		11,861	_				# FLOORS	1
SLAB PERIMETER: (F1)		509	-					
I. AREAS: ([] FIELD VERIFII	ED ELEV	ATION PLANS)						
			NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS		(SQ. FT)	2,859	3,278	729	476	7,342	
GLASS		(SQ. FT)	310	976	0	0	1,286	
PERSONNEL DOOR OVERHEAD DOOR		(SQ. FT)	297	105	0	0	402	
WALLS, NET		(SQ. FT)	0 2 2 5 2	0 2 107	0	0	0	
ROOF AREA (OR CEILING ARE	AIFAT		2,252	2,197	729	476	5,654	
OVERHEAD DOOR	AI	(SQ. FT)		PERSONN	FL DOOR	(SQ. FT)	11,869	
BASEMENT WALLS		(SQ. FT)	0	0	0		402	
II. CONSTRUCTION: ([] FIEL	D VERIE	IED WALL BOOK	WINDOW			<u> </u>	<u>_</u>	
WALLS: (SKETCH CROSS SE	CTION O	F WALL)	, ***********	, DOOR I		OMPONEN	TS I	R-VALUE
						OUTSIDE		0.17
						4" FACE I		0.43
					3.	AIR SPAC		0.91
						6" CMU		1.89
					5.			
					6.	INCIDE AL	5.50.4	
					/.	INSIDE AI	R-VALL =	0.68
						TOTAL	U=1/R	4.08 0.245
							0-1/10	0.245
ROOF: (SKETCH CROSS SECT	TION OF	ROOF)			CC	MPONEN	rs	R-VALUE
STORAGE AREA (7674 SF)		ADMIN AREA (4)				STORAGE		28.19
OUTSIDE AIR FILM BUILT UP ROOF		OUTSIDE AIR FIL BUILT UP ROOF	M	0.17		ADMIN AF	REA	13.57
2" RIGID INSULATION		2" RIGID INSULA	TION	0.34 8.00	3. 4.			
METAL ROOF DECK		CEILING AIR SPA		1.00	5.			
6" BATT INSULATION		CEILING TILE		1.20	6.			
		CEILING AIR SPA	CE	1.00	7.			
NSIDE AIR FILM		ACOUSTIC TILE		1.35	į	AVG. R-	ROOF =	23.02
R-value	28.19	INSIDE AIR FILM		0.68			U = 1/R	0.043
GLASS TYPE:	l	PPG 'PENNVERNO	R-value	13.57	A 80 0 0			
SLAB TYPE FLOOR:		4" CONCRETE	JIN C.L. I	WINDV, SS.	A, .88 S.C.		R-GLASS	1.61
BASEMENT TYPE:		NONE					SLF R-BASEM.	0.83
OVERHEAD DOOR TYPE:		NONE		-			R-ODOOR	0.00
PERSONNEL DOOR TYPE:		METAL					R-PDOOR	2.56
II. INFILTRATION:								2.00
TIGHT WALL H/M/L (SQ.FT.)				X CFM /	SQ.FT.	0.000	=	0
AVG. WALL H/M/L (SQ.FT.)		M	7342	X CFM /		0.115	=	844
EAKY WALL H/M/L (SQ.FT.)				X CFM /	SQ.FT.	0.000	=	0
OOR OPENINGS / HR - SINGL			15		OPENING /HR	1.600	=	24
DOOR OPENINGS / HR - DOUB	LE DOOF	15	20		OPENING /HR	1.385		28
			[IOTAL INF	ILTRATION (CF	M)		896
UA ODOOR	=	ODOOR AREA	0		X DOOR "U"	0.000	=	0
UA PDOOR	=	PDOOR AREA	402		X DOOR "U"	0.391	=	157
UA WALL	=	WALL AREA	5,654		X WALL "U"	0.245	=	1,385
UA ROOF		ROOF AREA	11,869		X ROOF "U"	0.043	=	516
UA GLASS UA SLAB	=	GLASS AREA	1,286		X GLASS "U"	0.621	=	799
UA BASEM.	- -	SLAB PERIM. B-WALL AREA	509 0		X SLF	0.830		422
INFILTRATION		CFM	896		X BASE. "U" X A. T. F.	0.000 1.035		027
			300				=	927
					OTAL UA (BTL	J/HR°F)		4,206

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE: PREPARED BY: 26-Jan-96 DMS

CHECKED BY:

AJN

FILE:

655.XLS

BLDG:

G: **655** ZONE:

	Rates	of H	leat Gain from Occupants of Co	nditioned Spaces				
Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
0	40	2	Seated very light work (writing)	Offices, hotels, apts	245	155	9,800	6,200
	0	0					0	0
	0	0					0	0
TOTAL	40					TOTAL	9,800	6,200

			Peak Wattage Value for Lights		
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage
0	45	20	Incandescent - 100w	100	4,500
	31	18	Incandescent - 60w	60	1,860
	14	4	Fluorescent, 4 - 40w lamps, 2 - 16w ballasts (2x4 ft. fix.)	192	2,688
	36	17	Fluorescent, 2 - 40w lamps, 16w ballasts (2x2 ft. fix.)	56	2,016
	2	2	Fluorescent, 2 - 40w lamps, 16w ballast (1x4 ft. fixture)	96	192
			0	0	0
			0	0	0
		0	0	0	. 0
TOTAL	128			TOTAL	11,256

			Peak Value for Internal Gains				
Zone	No. of	Equip.		Average	Heat Gain	Total	Total
No.	Equip.	Type	Description	Wattage	to Space(%)	Wattage	(BTU)
0	10	8	Terminal	145	90%	1,450	4,949
	10	5	Printer (laser)	870	34%	8,700	29,693
	5	56	Refrigerator/Freezer(Frostless 14 cu. ft.)	615	35%	3,075	10,495
	5	12	Typewriter	100	10%	500	1,707
						0	0
						0	0
						0	0
						0	0
						0	0
ł [0	0
						0	0
[0	0
						0	0
[0	0
l [0	0
[TOTAL	40%	13,725	46,843

EMC Engineers, Inc.

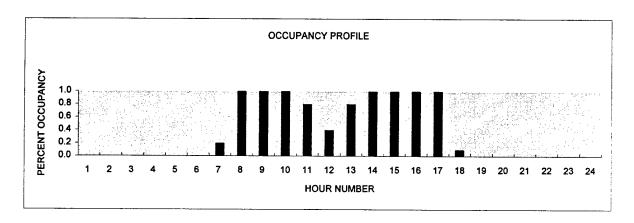
PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

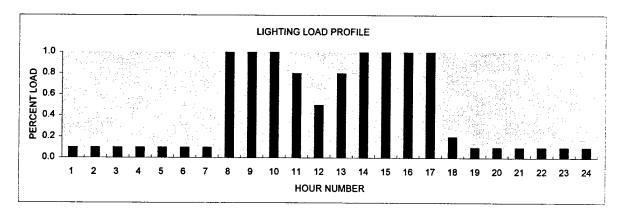
CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

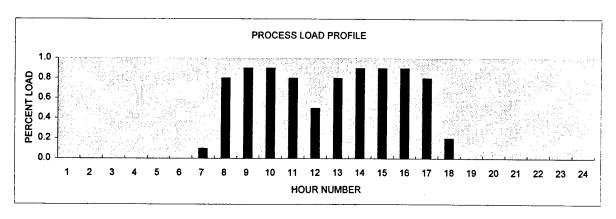
EMC NO.: 1406-011
DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN
FILE: 655.XLS

BLDG: ZONE: 655

BLD	BLDG	TYPE OF											HOUI	R NUI	MBER	1										
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0.0	0.0	0.0	0.0	0.0	0.0	0.2	1.0	1.0	1.0	8.0	0.4	0.8	1.0	1.0	1.0	1.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.0	1.0	1.0	0.8	0.5	0.8	1.0	1.0	1.0	1.0	0.2	0.1	0.1	0.1	0.1	0.1	0.1
oxdot		PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.8	0.9	0.9	0.8	0.5	0.8	0.9	0.9	0.9	0.8	0.2	0.0	0.0	0.0	0.0	0.0	0.0







```
BLDG 655 - ADMINISTRATION / SUPPLY BASELINE
----- PROGRAM CONTROL OPTIONS ------
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1)
                              37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                             1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                  70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 1.000000
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 146321.000000
FLOOR AREA (SQFT) 11861.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 493300.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX)
                                                0.00000E+00
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 118610.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 896.000000
INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
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    1.00

    1.00
    1.00
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           1.00
       1.00
                                                              1.00
                                                                          1.00
 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 3.670000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 22638.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 442.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 157.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
```

WALL DATA

WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	2197.0	476.0	2252.0	729.0
WINDOW AREA SQFT (AWND)	976.0	.0	310.0	.0
WINDOW HEIGHT FT (WNDH)	10.0	.0	10.0	.0
WINDOW WIDTH FT (WNDW)	97.6	.0	31.0	.0
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	.0	.0	. 0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120 0
U VALUE BTU/(HR-SQFT-F) (UW)	.245	.245	.245	245
WALL TRANSFER FUNCTIONS				
CN FACTORS	.01837	.01837	.01837	.01837
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)			-	J
N=1	.00003	.00003	.00003	. 00003
N=2	.00283	.00283	.00283	00283
N=3	.01017	.01017	.00283 .01017	01017
N=4	00498	00400	00400	00400
N=5	.00037	.00037	.00037	.00037
N=6	*****	*****	*****	******
NUMBER OF DN FACTORS (ND)	5	5	.00498 .00037 ******	5
DN FACTORS			-	3
N=1	1.00000	1.00000	1.00000	1 00000
NUMBER OF DN FACTORS (ND) DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6 ROOF APER SOFT (APOE)	-1.50943	-1.50943	-1.50943	-1 50943
N=3	.65654	.65654	.65654	65654
N=4	07415	07415	- 07415	- 07415
N=5	.00212	.00212	00212	00212
N=6	*****	*****	******	******
ROOF AREA SQFT (AROF) 11869	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 4.30	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	2.2870	10E-04	_	
ROOF B TRANSFER FUNCTIONS (BNR)			
.000 .211E-05 .316E-04	.104E-03	.780E-04	.148E-04	
ROOF D TRANSFER FUNCTIONS (DNR)			
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKILIGHT WIDTH FT (SKW) 0.00	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	O.00	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0.	.000000E+0	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST,	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	isk (mnd, ni	OND)	1	1
SKY LIGHT AREA SQFT (ASKY) (0.00000E+0	00		
DAYTIME SKY LIGHT U BTU/SQFT-HE NIGHT TIME SKYLIGHT U BTU/SQFT-	(-F (SKYU)	1.	292998	
FRACTION OF PROCESS HEAT TO INT	HK-F (SKYU	JN)	1.292998	
TRUCTION OF PROCESS REAL TO INT	EKNAL SPAC	E (FAP)	4.000000E	2-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -	- 	- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	18737.	9800.	6200.		
HOUR	HO	URLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	.0
2	.100	.000	.000	.000	70.0	. 0
3	.100	.000	.000	.000	70.0	.0
4	.100	.000	.000	.000	70.0	.0
5	.100	.000	.000	.000	70.0	.0
6	.100	.000	.000	.000	70.0	.0
7	.100	.100	.200	.200	70.0	.0
8	1.000	.800	1.000	1.000	70.0	.0

					50 0		^
9	1.000	.900	1.000		70.0		.0
10	1.000	.900	1.000		70.0		. 0
11	.800	.800	.800	.800	70.0		.0
12	.500	.700	.400	.400	70.0		.0
13	.800	.800	.800	.800	70.0		.0
14	1.000	.900	1.000	1.000	70.0		.0
15	1.000	.900	1.000	1.000	70.0		.0
16	1.000	.900	1.000	1.000	70.0		.0
17	1.000	.800	1.000		70.0		.0
18	.200	.200	.100	.100	70.0		. 0
19	.100	.000	.000	.000	70.0		.0
20	.100	.000	.000	.000	70.0		.0
21	.100	.000	.000	.000	70.0		. 0
22	.100	.000	.000	.000	70.0		.0
23	.100	.000	.000		70.0		. 0
24	.100	.000		.000			.0
	ING ABOVE AMB						
	ING BELOW AMB			OT) 100	.000000		
	TYPE, (IECN)		2				
	AIR CFM (SACF						
	ZER HIGH TEMP						
	SUPPLY AIR ST						
	SUPPLY AIR ST						
	MIXED AIR TEM						
	SIDE AIR FRAC		•	0.00000	00E+00		
	ICIENCY (EFAN	•					
	AL PRESSURE I						
	PLANT RATED						
	PLANT RATED		• •				
	PLANT PART L						
.100	.191	.200	.286	.300		.400	.451
.500		.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				
	TYPE (ITYPCH		4				
	PLANT RATED						
	PLANT RATED						
	PLANT PART LO			· · · · · · · · · · · · · · · · · · ·	•		
.000	.000	.000	.000			.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	'N				
			SOLAR		DOOR	! •			VENT	
			THRU		AND				AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	V INFL	LATENT
JAN	0.	GAIN	22.	0.	0.	0.	0.	0.	0.	0.
	-126.	LOSS		-3.	-16.	0.	-29.	-18.	-100.	0.
FEB	.00	GAIN	24.45	.00	.00	.00	.01	.00	.00	.00
	-98.95	LOSS		-2.23	-13.66			-15.48		.00
	.00	GAIN	30.26	.00	.00	.00	.25	.00	.00	.00
	-80.07	LOSS		-2.06	-13.24	.00	-18.46	-14.99	-79.94	.00
			28.94	.00	.00	.00	.80	.00	.00	.00
	-36.46	LOSS		-1.36	-9.25	.00	-10.05	-10.54	-52.30	.00
					.01		1.26	.01	.03	.00
	-12.10	LOSS		-1.05	-7.97	.00	-6.48	-8.74	-38.17	.00
JUN			31.57		.01			.01		.00
	-2.00	LOSS		83	-6.87	.00	-4.33	-7.59	-33.15	.00
JUL	0.0	CATH	21 00							
001		LOSS	31.90		.05			.06		.00
	/6	LUSS		80	-6.85	.00	-4.29	-7.62	-33.44	.00
ΔIIG	.00	CATN	27 60	.00	.02	0.0	1 50	0.0	• •	
AUG	-1.30		27.00		-6.52			.02 -7.14		.00
	1.50	БОВВ		01	-0.52	.00	-4.65	-/.14	-30.09	.00
SEP	.00	GAIN	25 90	0.0	.04	0.0	1 02	0.4	.17	.00
	-12.05				-6.82			-7.65		.00
					0.02		0.50	7.05	34.00	.00
OCT	.00	GAIN	24.09	.00	.00	.00	.16	.00	.01	.00
	-33.18				-8.75				-44.45	.00
NOV	.00	GAIN	20.95	.00	.00	.00	.01	.00	.00	.00
	-63.63	LOSS		-1.86	-10.89	.00	-17.76	-12.08	-59.74	.00
DEC	0.		20.			0.	0.	0.	0.	0.
	-123.	LOSS		-3.	-16.	0.	-29.	-17.	-95.	0.
	_									
TOT					0.					0.
	-589.	LOSS		-19.	-122.	0.	-165.	-137.	-688.	0.
M2 32										
MAX	HEATING	LOAD=	-478	803. I	BTUH ON I	DEC 18	HOUR 4	AMB:	IENT TEMP	
MAX	COOLING	LOAD=		0. I	BTUH ON I	DEC 31	HOUR 24	AMB:	IENT TEMP	42.

ZONE UA BTU/HR-F 2849.9

BEACON Energy Analysis By EMC Engineers, Inc. 655.I

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

YEAR

TAIMEDAT	N T								FAN TO	TAL
INTERN	INTE		SPACE URE F			COIN- CIDENT	THOUSAND	MILLION	HEAT MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR .	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	85.	69.		16 6	61. 4.	3.32	11.33	.00	18.39
FEB	71.	87.	69.				2.96	10.11	.00	16.40
MAR	73.	104.	69.			76. 15.	3.27	11.17	.00	18.12
APR	77.	108.	69.			84. 30.	3.15	10.76	.00	17.46
MAY	83.	114.	69.			85. 39.	3.32	11.33	.00	18.39
JUN	89.	118.	70.			87. 56.	3.15	10.76	.00	17.46
JUL	93.	124.	70.		16 5	95. 57.	3.27	11.17	.00	18.12
AUG	91.	119.	70.				3.32	11.33	.00	18.39
SEP	84.	117.	70.	7 15		86. 39.	3.10	10.60	.00	17.20
OCT	77.	112.	69.	4 28		81. 33.	3.32	11.33	.00	18.39
NOV	73.	100.	69.	8	16 6	75. 18.	3.20	10.92	.00	17.72
DEC	70.	85.	69.	23 18		67. -1.	3.22	11.00	.00	17.86

38.59 131.80 .00 213.89

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BT	IJ
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
T2.37	660		_			
JAN	669	0	0	0	4669E+06	.0000
FEB	549	0	0	0	3829E+06	.0000
MAR	512	0	0	0	3897E+06	.0000
APR	328	0	0	0	2371E+06	.0000
MAY	194	0	0	0	1622E+06	.0000
JUN	62	0	0	0	7106E+05	.0000
JUL	28	0	0	0	5987E+05	.0000
AUG	34	0	0	0	8431E+05	.0000
SEP	151	0	0	0	1544E+06	.0000
OCT	349	0	0	0	2186E+06	.0000
NOV	492	0	0	0	3086E+06	.0000
DEC	659	0	0	0	4788E+06	.0000
YEAR	4027	0	0	0	4788E+06	.0000

BEACON Energy Analysis By EMC Engineers, Inc.

655.I

SYSTEM TOTALS

		ENERG	Y CONSUMPT	'ION	TOTAL INTERNAL MAXIMUM				
	HEATING	COOLING	LIGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC		
	MILLION	THOUSAND	THOUSAND	MILLION	THOUSAND	MILLION	DEMAND		
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW		
JAN	181.50	.00	3.32	11.33	.00	18.39	11.3		
FEB	144.39	.00	2.96	10.11	.00	16.40	11.3		
MAR	121.44	.00	3.27	11.17	.00	18.12	11.3		
APR	62.35	.00	3.15	10.76	.00	17.46	11.3		
MAY	27.57	.00	3.32	11.33	.00	18.39	11.3		
JUN	7.50	.00	3.15	10.76	.00	17.46	11.3		
JUL	3.31	.00	3.27	11.17	.00	18.12	11.3		
AUG	4.20	.00	3.32	11.33	.00	18.39	11.3		
SEP	24.20	.00	3.10	10.60	.00	17.20	11.3		
OCT	61.24	.00	3.32	11.33	.00	18.39	11.3		
NOV	103.21	.00	3.20	10.92	.00	17.72	11.3		
DEC	177.14	.00	3.22	11.00	.00	17.86	11.3		
YEAR	918.05	.00	38.59	131.80	.00	213.89	11.3		

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 99615. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc.

655.I

BLDG 655 - ADMINISTRATION / SUPPLY BASELINE

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL.	ACTUAL SOLAR INSOL.				~				
	HORIZ. SURF.	HORIZ.		AVG.	MAX SYS			S WHEN M LOADS	MAXIMUM COOLING	MAXIMUM HEATING
	BTU/	BTU/		MBT.	TEMP. DI			MET	LOAD	LOAD
MONTHU	SQFT-	SQFT-		DEG.	DEG.		COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	4669E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	3829E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	3897E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	2371E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	1622E+06
NUL	2647.	1993.	1.000	72.	0.	Ο.	0	0	.0000	7106E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	5987E+05
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.0000	8431E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	1544E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	2186E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	3086E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	4788E+06

.0 .0

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL ----- PROGRAM CONTROL OPTIONS -----COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) 1 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA ------*****REAL WEATHER FROM DISK****** FILE NAME MO STATION 13995 YEAR 1955 SITE LATITUDE DEG (AL1) 37.750000 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 1.000000 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 146321.000000 FLOOR AREA (SQFT) 11861.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 493300.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 118610.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 896.000000 INFILTRATION PROFILE
 1.00
 1.00
 1.00
 1.00
 1.00

 1.00
 1.00
 1.00
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 1.00

 1.00
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 1.00
 1.00
 A FACTOR IN INFILTRATION EQUATION (CINA) 3.670000E-01 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 22638.000000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 442.000000 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 157.000000
WINDOW GLASS NUMBER (NG) 30 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01 WINDOW SHADING FACTOR (SHD) 5.900000E-01 WALL DATA WALL NUMBER 1 2 3
AZIMUTH ANGLE (AZ) .00 90.00 180.00
WALL AREA SQFT (AWLL) 2197.0 476.0 2252.0
WINDOW AREA SQFT (AWND) 976.0 .0 310.0
WINDOW HEIGHT FT (WNDH) 10.0 .0 10.0
WINDOW WIDTH FT (WNDW) 97.6 .0 31.0
WIDTH OF OVERHANG (WOH) .0 .0 .0 3 180.00 -90.00 729.0 .0 .0 .0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120 0	120 0	120 0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	064	064	120.0
WALL TRANSFER FUNCTIONS			.004	.064
CN FACTORS	.00176	.00176	.00176	00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)		•	3	5
N=1	.00000	.00000	.00000	00000
N=2	.00016	.00016	00016	.00000
N=3	.00086	.00026	.00016 .00086	.00016
N=4	.00066	.00066	.00086 .00066	.00066
N=5	.00008	.00008	.00008	00000
N=6	*****	*****	******	******
NUMBER OF DN FACTORS (ND)	6	6	.00008	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000 -1.71064 .89735 16643	1 00000
N=2	-1.71064	-1.71064	-1.71064	-1 71064
N=3	.89735	.89735	89735	89735
N=4	16643	16643	- 16643	- 16643
N=5	.00728	.00728	.00728	00729
N=6	00002	00002	00002	- 00028
ROOF AREA SQFT (AROF) 11869	.000000		.00002	00002
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 4.30	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	2.2870	10E-04	_	
ROOF B TRANSFER FUNCTIONS (BNR))			
.000 .211E-05 .316E-04	.104E-03	.780E-04	.148E-04	
ROOF D TRANSFER FUNCTIONS (DNR)	1			
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)	0.0000001	7+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	0000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKILIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	0.00 (WC	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S	HSK) 0.	00000E+0	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST,	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	ISK (MND, NI	ND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	0		
DAYTIME SKY LIGHT U BTU/SQFT-HR NIGHT TIME SKYLIGHT U BTU/SQFT-	-F (SKYU)	1.	292998	
FRACTION OF PROGRESS WAS	HR-F (SKYU	N)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPAC	E (FAP)	4.000000E	-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	18737.	9800.	6200.		
HOUR	HO	OURLY FRACT	ION OF PE	AK		
1	.100	.000	.000	.000	70.0	. 0
2	.100	.000	.000	.000	70.0	.0
3	.100	.000	.000	.000	70.0	.0
4	.100	.000	.000	.000	70.0	.0
5	.100	.000	.000	.000	70.0	.0
6	.100	.000	.000	.000	70.0	.0
7	.100	.100	.200	.200	70.0	.0
8	1.000	.800	1.000	1.000	70.0	- 0

```
1.000.9001.0001.00070.01.000.9001.0001.00070.0
   9
                                                                               .0
  10
                                                                                 .0

      .800
      .800
      .600

      .700
      .400
      .400

      .800
      .800
      .800

      .900
      1.000
      1.000

      .900
      1.000
      1.000

      .900
      1.000
      1.000

      .800
      1.000
      1.000

      .200
      .100
      .100

      .000
      .000
      .000

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  11
              .800
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                                      .800
                                                  .800
                                                                 70.0
  12
               .500
                                                                 70.0
                                                                                   . 0
  13
               .800
                                                                 70.0
                                                                                  .0
                                                                                  .0
  14
             1.000
                                                                 70.0
             1.000
                                                                 70.0
  15
                                                                                  .0
             1.000
                                                                 70.0
  16
                                                           70.0
70.0
70.0
70.0
70.0
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            1.000
                                                                 70.0
  17
                                                                                   .0
             .200
                                                                                  .0
  18
              .100
  19
                                                                                  . 0
               .100
  20
                                                                                  .0
               .100
  21
                                                                                  .0
                       . 0
  22
               .100
              .100
                                                                                 .0
  23
               .100
                                                                                  .0
  24
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
                                                       100.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F 100.000000
SYSTEM SUPPLY AIR START TIME HR
                                       0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 0.000000E+00
FAN EFFICIENCY (EFAN) 1.000000E-05
FAN TOTAL PRESSURE IN. WATER (DP) 0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT) 493300.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 616625.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
        .191 .200 .286 .300 .369
                                                                        .400
                                                                                     .451
.500
            .537
                         .600
                                     .625
                                                 .700
                                                             .718
                                                                         .800
                                                                                     .812
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN) 0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
.000
                                                                                    .000
                                                                         .000
                                                                                      .000
            .000 .000 .000
 .000
```

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

	TH LOAD 0105.	GAIN	SOLAR THRU WINDOW 22.	ROOF	0.	BSM7 0. 0.	0.		VENT AND W INFL 0101.	LATENT 0. 0.
FEE	.00	GAIN LOSS				.00	.00		.00 -87.28	.00
MAR	.00	GAIN LOSS			.00 -13.46		.00			.00
	.00	GAIN LOSS	28.94		.00 -9.44		.01 -2.61			.00
MAY	.00 -9.44	GAIN LOSS	30.73		.00 -8.12		.03 -1.49			.00
JUN	.00 -1.12	GAIN LOSS	31.57		.00 -7.01		.07 83		.01 -33.69	.00
	.00 36	GAIN LOSS	31.90	83	.02 -7.00		.07 81			.00
AUG	.00 84	GAIN LOSS	27.60	.00 85		.00	.03 99		.01 -31.11	.00
	.00 -9.93	LOSS		-1.05	-7.03	.00	.04 ~1.55	-7.89		.00
	-27.53	LOSS		~1.51	.00 -9.07	.00	-3.12			.00
	.00 -52.67	LOSS		-1.90	.00 -11.14	.00	-4.76	.00 -12.35	-61.20	.00
	0. -102.	LOSS		-3.	0. -16.		0. -8.			0. 0.
	0. -494.		318.		0. -125.	0. 0.	0. -42.	0. -140.	0. -700.	0. 0.
MAX MAX	HEATING COOLING	LOAD= LOAD=	-418	405. Bi	TUH ON DEC	2 18 2 31	HOUR 2 HOUR 24	AMB AMB	IENT TEMP IENT TEMP	3. 42.

ZONE UA BTU/HR-F 1826.5

BEACON Energy Analysis By EMC Engineers, Inc. 655FG.I BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

									FAN T	OTAL
INTERN		ד ג זא כו	SPACE		,	COIN-	I.TCHTTNG	PROCESS	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND		MILLION	MILLION
MONTH								BTU	BTU	BTU
JAN	71.	87.		5		61.	3.32	11.33	.00	18.39
			69.	27	6	4.				
FEB	71.	89.		13	16	68.	2.96	10.11	.00	16.40
			69.	2	3	15.				
MAR	73.	104.		28	16	76.	3.27	11.17	.00	18.12
			69.			16.				
APR	78.	107.				84.	3.15	10.76	.00	17.46
			70.	14	5	30.				
MAY	84.	113.		29	16	85.	3.32	11.33	.00	18.39
			70.	11	4	38.				
77.13.7	80	117.		29	16	87.	3.15	10.76	.00	17.46
JUN	69.	11/.	70.			56.	3.15	10.76	.00	17.40
			,	1,	,	50.				
JUL	93.	124.		31		95.	3.27	11.17	.00	18.12
			70.	10	5	57.				
AUG	91.	119.		29	16	95.	3.32	11.33	.00	18.39
			70.			52.				
SEP	85.	116.		7		86.	3.10	10.60	.00	17.20
			70.	15	6	39.				
OCT	77.	111.		4	16	81.	3.32	11.33	.00	18.39
			70.	28	5	31.				
NOV	72	100.		8	16	75.	3.20	10.92	.00	17.72
NOV	/3.	100.	69.		4		3.20	10.92	.00	17.72
			03.	3	72	± / •				
DEC	71.	88.		12			3.22	11.00	.00	17.86
			69.	18	4	1.				
YEAR							38.59	131 80	.00	213.89
TTU							50.55	_51.50		

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BT	IJ
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	637	0	0	0	4120E+06	.0000
FEB	524	0	0	0	3363E+06	.0000
MAR	489	0	0	0	3443E+06	.0000
APR	313	0	0	0	2040E+06	.0000
MAY	168	0	0	0	1384E+06	.0000
JUN	37	0	0	0	5798E+05	.0000
JUL	19	0	0	0	4744E+05	.0000
AUG	24	0	0	0	7051E+05	.0000
SEP	135	0	0	0	1310E+06	.0000
OCT	314	0	0	0	1910E+06	.0000
NOV	446	0	0	0	2632E+06	.0000
DEC	633	0	0	0	4184E+06	.0000
YEAR	3739	0	0	0	~.4184E+06	.0000

BEACON Energy Analysis By EMC Engineers, Inc.

655FG.I

SYSTEM TOTALS

	HEATING MILLION	ENERG COOLING THOUSAND	Y CONSUMPT	PROCESS	FANS	OTAL INTERNAL HEAT GAIN	MAXIMUM ELECTRIC
MONTH		KWH	THOUSAND KWH	MILLION BTU	THOUSAND KWH	MILLION BTU	DEMAND KW
JAN	157.44	.00	3.32	11.33	.00	18.39	11.3
FEB	126.68	.00	2.96	10.11	.00	16.40	11.3
MAR	107.68	.00	3.27	11.17	.00	18.12	11.3
APR	56.33	.00	3.15	10.76	.00	17.46	11.3
MAY	23.00	.00	3.32	11.33	.00	18.39	11.3
JUN	4.38	.00	3.15	10.76	.00	17.46	11.3
JUL	2.23	.00	3.27	11.17	.00	18.12	11.3
SEP	2.90	.00	3.32	11.33	.00	18.39	11.3
OCT	52.45	.00	3.10	10.60	.00	17.20	11.3
NOV	88.14	.00		11.33	.00	18.39	11.3
			3.20	10.92	.00	17.72	11.3
DEC	153.90	.00	3.22	11.00	.00	17.86	11.3
YEAR	795.66	.00	38.59	131.80	.00	213.89	11.3

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 89297. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 655FG.I

BLDG 655 - ADMIN / SUPPLY - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALL

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	4120E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	3363E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	3443E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	2040E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	1384E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	5798E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	4744E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	7051E+05
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.0000	1310E+06
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.0000	1910E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	2632E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	4184E+06

.0

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BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 6.000000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
  FILE NAME MO
 STATION 13995
                YEAR 1955
 SITE LATITUDE DEG (AL1)
                               37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                               1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                   70.000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 146321.000000
 FLOOR AREA (SQFT) 11861.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 493300.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 118610.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 896.000000
 INFILTRATION PROFILE

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    1.00
    1.00
    1.00
    1.00

                                                    1.00 1.00 1.00
1.00 1.00 1.00
                                                              1.00 1.00
A FACTOR IN INFILTRATION EQUATION (CINA) 3.670000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 22638.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 442.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 157.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                   WALL DATA
                                   1 2
WALL NUMBER
                                                        3
                                                                  4
AZIMUTH ANGLE (AZ) .00 90.00 180.00
WALL AREA SQFT (AWLL) 2197.0 476.0 2252.0
WINDOW AREA SQFT (AWND) 976.0 .0 310.0
WINDOW HEIGHT FT (WNDH) 10.0 .0 10.0
WINDOW WIDTH FT (WNDW) 97.6 .0 31.0
WIDTH OF OVERHANG (WOH) .0 .0 .0
OVERHANG HGT ABV WNDW (HOH) .0 .0 .0
                                 .00 90.00 180.00
                                                                -90.00
                                             476.0 2252.0 729.0
                                                                 .0
                                                                     .0
                                                                    . 0
                                                                     .0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0 .055	120.0 .055	120.0 .055	120.0 .055
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00174		.00174	
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=6	*****	*****	******	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				-
N=1 N=2 N=3 N=4	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	. 83196	83196
N=4	14508	14508	- 14508	- 14508
N=5	.00613	.00613	.00613	00613
N=6			00002	
ROOF AREA SQFT (AROF) 11869	000002	.00002	.00002	00002
ROOF U VALUE BTU/HR-SQFT-F (UR		00005-02		
ROOF TRANS FUNCTIONS USED (1=Y)			,	
ROOF C TRANSFER FUNCTION (CNR)			1	
ROOF B TRANSFER FUNCTIONS (BNR	2.2070	10E-04		
.000 .211E-05 .316E-04	/ 104E 03	7000 04	1405 04	
ROOF D TRANSFER FUNCTIONS (DNR		./8UE-U4	.148E-U4	
1.00 -1.97 1.36		E24E 01	0505.00	
SKYLIGHT TILT DEGREES (TILT)			250E-02	
SKYLIGHT AZIMUTH ANGLE DEGREES	(3707)	E+UU	000	
			000	
SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00	000000000000000000000000000000000000000			
SKYLIGHT OVERHANG WIDTH FT (SKO		000000		
OVERHANG HEIGHT ABOVE SKYLIGHT	JW/ 0.0 PT /でかな)	00000E+00	005.00	
SKYLIGHT GLASS NUMBER (NS)	ri (SKOH)	0.0000	00E+00	
SKYLIGHT SHADING COEFFICIENT (S	cnck) v	0000000	0	
SUMMER START MONTH AND DAY FOR				-
SUMMER END MONTH AND DAY FOR SI	DISK (MND NDI	, ND31)	, ±	1
SKY LIGHT AREA SQFT (ASKY)		י שאט	Т	1
DAYTIME SKY LIGHT U BTU/SQFT-H			202000	
NIGHT TIME SKYLIGHT U BTU/SQFT-	r (DRIU)	I.	434338	
FRACTION OF PROCESS HEAT TO IN	וצאכן ז-אח- ייתה זגואמיםי	714 <i>)</i>	1.292998	7 01
INACITOR OF PROCESS REAL TO IN.	LEKNAL SPA	LE (FAP)	4.0000001	2-01

-----INTERNAL GAINS AND PROFILES ------

THERMOSTAT SET POINT DEG F

	KW -		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	18737.	9800.	6200.		
HOUR	HO	OURLY FRACT	CION OF PEA	AK		
1	.100	.000	.000	.000	70.0	. 0
2	.100	.000	.000	.000	70.0	.0
3	.100	.000	.000	.000	70.0	.0
4	.100	.000	.000	.000	70.0	.0
5	.100	.000	.000	.000	70.0	.0
6	.100	.000	.000	.000	70.0	.0
7	.100	.100	.200	.200	70.0	.0
8	1.000	.800	1.000	1.000	70.0	. 0

```
    1.000
    .900
    1.000
    1.000
    70.0
    .0

    1.000
    .900
    1.000
    1.000
    70.0
    .0

  9
 10
                            .800
                                                 70.0
                                     .800
                                                             .0
  11
          .800
                    .800
                                                70.0
           .500
                    .700
                             .400
                                      .400
  12
                                                             .0
                                                70.0
                   .800 .800 .800
.900 1.000 1.000
  13
           .800
                                                             .0
                                              70.0
70.0
         1.000
  14
                   .900 1.000 1.000
         1.000
 15
                                                             . 0
                 1.000
                                                70.0
                                                             .0
 16
                                                70.0
                                                             .0
 17
         1.000
                                              70.0
70.0
70.0
70.0
70.0
  18
          .200
                                                             .0
           .100
 19
                                                              . 0
           .100
  20
                                                             . 0
                         21
           .100
                                                             . 0
           .100
 22
                                                             . 0
      .100
                 .000
 23
                                                             . 0
                                                             .0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                         100.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 0.000000E+00
ECONOMIZER HIGH TEMP LIMIT F 100.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 0.000000E+00
FAN EFFICIENCY (EFAN) 1.000000E-05
FAN TOTAL PRESSURE IN. WATER (DP) 0.000000E+00
HEATING PLANT RATED OUTPUT BTU (HFLOT) 493300.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 616625.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                      .400 .451
.100 .191 .200 .286 .300 .369
         .537
                  .600
                           .625
                                    .700
                                             .718
                                                      .800
.500
                                                               .812
.900 .906 1.00 1.00 CHILLER TYPE (ITYPCH) 4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 1.000000E-10
COOLING PLANT RATED INPUT BTU (CFLIN) 0.000000E+00
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (FLC)

.000 .000 .000 .000 .000 .000 .000

.000 .000 .000 .000 .000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
         .000 .000 .000
.000
```

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	TN				
			SOLAR		DOC	R			VENT	
			THRU		AND				AND	
	H LOAD						WALL	WINDO		
JAN	0.		22.							0.
	-104.	LOSS		-3.	-16.	0.	-7.	-18.	-101.	0.
PPP	.00	CATM	04 45							
	-83.47	GAIN LOSS			.00				.00	
	03.47	позз		-2.26	-13.86	.00	-5.13	-15.71	-87.37	.00
MAR	.00	GAIN	30.26	. 00	.00	.00	0.0	.00	0.0	0.0
	-68.08	LOSS			-13.48			-15.26		.00
					20.10	.00	4.45	13.20	-01.44	.00
APR	.00	GAIN	28.94	.00	.00	.00	.01	.00	. 0.0	.00
	-31.31	LOSS			-9.46			-10.78		.00
MAY	.00	GAIN	30.73	.00	.00	.00	.04	.01	.02	.00
	-9.37	LOSS		-1.08	-8.13	.00	-1.30	-8.92	-39.00	.00
JUN	.00		31.57				.08		.01	.00
	-1.10	LOSS		86	-7.02	.00	74	-7.76	-33.75	.00
.1111.	.00	GAIN	21 00	0.0	0.0	0.0				
OOL	36		31.90		.02 -7.01		.08 72			.00
		2000		05	-7.01	.00	/2	-/.81	-34.13	.00
AUG	.00	GAIN	27.60	.00	.00	.00	. 04	.00	0.1	.00
	83			85			87			.00
SEP	.00					.00	.04	.02	.07	.00
	-9.86	LOSS		-1.05	-7.05	.00	-1.35	-7.91	-36.01	.00
OCT	.00	~ T T T T	24 00		•					
	-27.29	LOSS	24.09		-9.09		.00			.00
	21.25	1033		-1.52	-9.09	.00	-2.70	-10.07	-46.41	.00
NOV	.00	GAIN	20.95	.00	. 00	0.0	.00	0.0	0.0	.00
	-52.16				-11.16		-4.10			.00
							1.10	12.57	01.50	.00
DEC	0.	GAIN	20.	0.	0.	0.	0.	0.	0.	0.
	-101.	LOSS		-3.	-16.	0.	-7.	-18.	-96.	0.
										• •
TOT	0.		318.	0.	0.	0.	0.	0.	0.	0.
	-490.	LOSS		-19.	-125.	0.	-37.	-140.	-702.	0.
MAY	IIDA MTNO	TOND	4	440 =				*		
MAX	COOLING	TOYD=	-416	418. B	TUH ON	DEC 18	HOUR 2	AMB	IENT TEMP	
1.147.V	COOPING	TOAD=		υ. в	TOH ON	DEC 31	HOUR 24	AMB:	IENT TEMP	42.

ZONE UA BTU/HR-F 1775.7

BEACON Energy Analysis By EMC Engineers, Inc. 655RGD.I

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

									FAN T	OTAL
INTERN		PNAT.	SPACE			COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND		MILLION	MILLION
MONTH	AVG.	MAX	MIN	DAY	HR 2	AMBT.		BTU	BTU	BTU
JAN	71.	87.	69.	5 27		61. 4.	3.32	11.33	.00	18.39
FEB	72.	89.	69.	13 2		68. 15.	2.96	10.11	.00	16.40
MAR	73.	104.	69.		16 5	76. 16.	3.27	11.17	.00	18.12
APR	78.	107.	70.			84. 30.	3.15	10.76	.00	17.46
MAY	84.	113.	70.			85. 38.	3.32	11.33	.00	18.39
JUN	89.	117.	70.			87. 56.	3.15	10.76	.00	17.46
JUL	93.	124.	70.	31 10		95. 57.	3.27	11.17	.00	18.12
AUG	91.	119.	70.			95. 52.	3.32	11.33	.00	18.39
SEP	85.	116.	70.	7 15		86. 39.	3.10	10.60	.00	17.20
OCT	77.	111.	70.	4 28	16 5	81. 31.	3.32	11.33	.00	18.39
NOV	73.	100.	69.	8 3	16 4		3.20	10.92	.00	17.72
DEC	71.	88.	69.	12 18		59. 1.	3.22	11.00	.00	17.86
YEAR							38.59	131.80	.00	213.89

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF H	OURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WERE	NOT MET	вт	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OLING	HEATING	COOLING
JAN	636	0	0	0 -	4104E+06	.0000
FEB	523	0	0	_	3347E+06	.0000
MAR	488	0	0		3429E+06	.0000
APR	313	0	0		2034E+06	.0000
MAY	167	0	0		.1379E+06	.0000
JUN	37	0	0		5783E+05	.0000
JUL	19	0	0	-	.4728E+05	.0000
AUG	24	0	0		.7030E+05	.0000
SEP	135	0	0		.1305E+06	.0000
OCT	311	0	0		.1902E+06	.0000
NOV	440	0	0		.2616E+06	.0000
DEC	632	0	0	-	.4164E+06	.0000
YEAR	3725	0	0	-	.4164E+06	.0000

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	156.38	.00	3.32	11.33	.00	18.39	11.3
FEB	125.89	.00	2.96	10.11	.00	16.40	11.3
MAR	107.10	.00	3.27	11.17	.00	18.12	11.3
APR	56.16	.00	3.15	10.76	.00	17.46	11.3
MAY	22.84	.00	3.32	11.33	.00	18.39	11.3
JUN	4.38	.00	3.15	10.76	.00	17.46	11.3
JUL	2.23	.00	3.27	11.17	.00	18.12	11.3
AUG	2.90	.00	3.32	11.33	.00	18.39	11.3
SEP	20.48	.00	3.10	10.60	.00	17.20	11.3
OCT	51.92	.00	3.32	11.33	.00	18.39	11.3
NOV	87.03	.00	3.20	10.92	.00	17.72	11.3
DEC	152.85	.00	3.22	11.00	.00	17.86	11.3
YEAR	790.16	.00	38.59	131.80	.00	213.89	11.3

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 88833. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 655RGD.I

BLDG 655 - ADMIN / SUPPLY ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/		AVG. AMBT.	MAX SYS		SYSTE	S WHEN M LOADS MET	MAXIMUM COOLING LOAD	MAXIMUM HEATING LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.		COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-			210	210
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	4104E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	3347E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	3429E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	2034E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	1379E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	5783E+05
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	4728E+05
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	7030E+05
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	1305E+06
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.0000	1902E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	2616E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	4164E+06

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORM	ATION:					
Building No:	655	Building Name	: Administration/Supply			
Surveyed by:	AJN	Date:	11/7/95	Building Use:	Administration	n/Supply
Building Contact:	Capt. Barre	tt	1	Phone No:	596-3734	
Building Contact:				Phone No:	V	
OCCUPANCY:						
Number of Employee	es: Mon./Fri.:	40	Schedule:	800	То	1700
_	Tues./Thurs	S.			То	
	Wed.				То	, , , , , , , , , , , , , , , , , , ,
	Sat./Sun.	0			То	
Visitors Per Day:	Mon./Fri.:	0	Schedule:		То	
	Tues./Thurs	0			То	
	Wed.	0			То	4-4-7
	Sat./Sun.	0			То	
Comments:						
LIGHTING SCHEDU	LE:					
Normal Occupancy:	MonFri.:		Schedule:	800	То	1700
	Sat./Sun.:				То	
Cleaning Crew/2nd S	hift: MonFri.:		Schedule:		То	
	Sat./Sun.:				То	
EQUIPMENT SCHE	ULE:					
an/AHU Schedule:	MonFri.:		Schedule:	0	То	2400
	Sat./Sun.:			0	То	2400
Chiller Schedule:	MonFri.:		Schedule:		То	
	Sat./Sun.:				То	
Boiler Schedule:	MonFri.:		Schedule:	0	То	2400
	Sat./Sun.:			0	То	2400
ux. Equipment Sche	dule:					
Oomestic HW	MonFri.:		Schedule:	0	То	2400
	Sat./Sun.:			0	То	2400
	MonFri.:		Schedule:		То	
	Sat./Sun.:			· · · · · · · · · · · · · · · · · · ·	То	
comments:		748				

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

Building Name: Administration/Supply **Building No**

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING ENVELOPE

EXTERIOR WALLS			LIST OF EXT. WALL CONSTRUCTION TYPES	
Wall	Wall			
Direction (N	Construction		Wall Construction	
E, W, or S)	No.	Comments	No.	Description
N	XW-1		XW-I	Face Brick & CMU
Ε	XW-1		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-1		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-1		XW-4	Face Brick, CMU, & Plaster Coat
			XW-5	Insulated Metal Panel
		WAIDOMO		
WINDOWS Window Window			_	LIST OF WINDOW TYPES
Direction (N,	Construction		Window	
E, W, or S)	No.	Comments	Construction No.	Description
N	W-1		W-I	Double Pane Clear
Е	W-1		W-2	Double Pane Tinted
S	W-1		W-3	Single Pane with Storm Windows
W	W-1		W-4	
			W-4	Single Pane
			-	
ROOF CONSTRUCTION			LIST OF ROOF CONSTRUCTION TYPES	
	Roof			
Roof Location	Construction No.	0	Roof Construction	
Location	NO.	Comments	No.	Description
Admin. Area			R-I	BUR, Rigid Insul., Metal Deck, Air Space, Hard Board Ceiling. A space, Ceiling Tile
ALL	R-1		R-2	BUR, Rigid Insul., Metal Deck, 6" Batt Insul.
Supply Area			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
ALL	R-2		R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaste Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 655

Building Name: Administration/Supply

E M C No. 1406-011

Prepared by: DMS

Date: 2/18/96

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INTE	RIOR EQUIP	MENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall					
Direction (N,					
E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
N	A-2	10			Architectural
N	A-4	15		A-I	Interior Partitions
N	M-3		15 @ 10' ea.	A-2	Wall Placards
N	E-2	6		A-3	Drapery Valances
				A-4	Drapery Rods, Venician Blinds
E	E-2	3		A-5	Bleachers
				A-6	Lockers
S	M-3	10	10 @ 12' ea.	A-7	Mirror
S	E-2	6			
S	E-3	3			
S	F-4	5			
			Exterior walls in Administration Area are		Plumbing
			covered with wooden paneling 3'-0" A.F.F.	P-I	Sinks
		<u> </u>	colored that treaden partering of a 7th in 1	P-2	Commodes
			12'x12'x8' caged area with wood ceiling	P-3	Toilet Stalls
			located in supply area.	P-4	Water Fountains
			located in supply area.	· · · · · ·	HVAC Mechanical
				M-I	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Wall mounted convection type heater
		ļ		11-2	Wall mounted convection type neater
					Electrical
				E-1	Electrical Panels
				E-2	Electrical Outlets
				E-3	Electrical Light Switches
				E-4	Electrican Conduit
				E-5	Emergency light
				E-6	Electrical Disconnect
				<u> </u>	Lighting
				L-I	Wall Mounted Fixtures
		-		L-2	Ceiling Mounted Fixtures
		ļ		L-3	Exit Signs
	L	_			Fire Protection
				F-I	Alarm Pull Switches
	<u> </u>			F-2	Alarm Sound Devices (Speakers, Bells)
				F-2	Sprinkler Heads
				F-4	Fire Extinguishes
				1-4	the extiligrations
		-		1	
					Communication
				(-1	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks
	 			H	

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

EMC NO.: 1406-011

DATE:

FILE:

Feb-96

PREPARED BY:

655RD1

DMS

CHECKED BY:

AJN

LOCATION: FT. LEONARD WOOD

BLDG: 655

	PERIMETER RADIATION SURVEY OBSERVATIONS										
RD-1	PER RAD NO.	MECH. RM.	LOCATION (RM)								
CV-1	SOURCE OF HEATING	ALL	SERVES AREA								

UNIT TYPE:											
STEAM	х	HW	ELECTRIC								
OTHER											
COMMENT:											

HW PUMP 1 - HP	MFG.	MODEL
HW PUMP 2 - HP	MFG.	MODEL
HW PUMP 3 - HP	MFG.	MODEL
HW PUMP 4 - HP	MFG.	MODEL
IENT:		100.0% % AREA HEATING

					OPERAT	ION:					
HOURS	ON:		s	М	T	w	T	F	S	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	S ON:										
J	F	М	Α	М	j	J	Α	s	0	N	D
1	1	1	1	0	0	0	0	0	1	1	1

			CONTROLS	S:		
		PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
RADIATION CONTROL:	х	NONE	2-WAY VLV	3-WAY VLV	OTHER	
SPACE SETPOINT (oF):		OCC HEAT	UNOCC HEAT	OCC COOL	UNOCC COOL	
RESET CONTROL (oF):		нw ніgн	HW LOW	OA LOW	OA HIGH	
COMMENTS:				•		

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY:

AJN

	BLDG:	655	FILE:	655CV1								
	BOILER & CONVERTER SURVEY OBSERVATIONS											
CV-1	BOILER/CONVERTER NO.		MECH. RM.	LOCATION (RM)								
C.P.	SOURCE OF HEATING (PLANT)		ALL	SERVES AREA								

			UNIT TYPE		
	STEAM	PSIG	HW	ТЕМР.	BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:
X	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:
	SPACE HEAT	DHW	OTHER		USE:
OMME	NT:				% HTG AREA SERVED BB RADIATION ONLY

			N	AMEPLATE:			
DUNHAM-B	JSH	MFG.	FC-62-2	MODEL	520000	CAPACITY OUTPUT (B	TUH)
					547368	CAPACITY INPUT (BTU	IH)
		MFG.		MODEL		CAPACITY OUTPUT (B	TUH)
						CAPACITY INPUT (BTU	IH)
0.75 H	IW PUMP 1 -	HP GE	NERAL ELECTRIC	MFG.	5K38ND567		MODEL
ŀ	IW PUMP 2 -	HP		MFG.			MODEL
+	W PUMP 3 -	HP		MFG.			MODEL

				C	PERATI	ON:					
HOURS O	N:		S	М	Т	w	т	F	S	COMMENT	
PRESENT ST	ART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT ST	OP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED S	TART TIME										
REQUIRED S	TOP TIME										
MONTHS	ON:		***************************************							L	
J	F	м	Α	М	j	J	Α	S	0	N.	D
1	1	1	1	1	1	1	1	1	1	1	

		PNEUMATIC	X	ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	180	HW HIGH	90	HW LOW	65	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	TIMECLOC	K HAS NO PINS				·			

ANNUAL ENERGY SAVINGS SUMMARY FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652, 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
1	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
Buildi	ng Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
651	178.84	160.62	18.23	<i>7</i> 7.10	72.60	4.50	3754.18	3418.90	335.28

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
1		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 651	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
627	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
628	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
629	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
634	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
635	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
651	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
652	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
654	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
659	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
660	40,990	40,990	1.000	18.23	18.23	4.50	4.50	335.28	335.28
1012	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1013	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1014	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1015	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1016	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1028	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42
1029	40,640	40,990	0.991	18.23	18.07	4.50	4.46	335.28	332.42

^{*}Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652, 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak		-	Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
651	178.84	159.52	19.32	<i>7</i> 7.10	72.40	4.70	3754.18	3399.52	354.66

1									4
1 1					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
]			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building Bu	ilding	No. 651	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(kWh)	(kWh)	(kW)	(kW)	(MBtu)	(MBtu)
627 4	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
	0,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
	0,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
	0,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
	0,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
654 40	0,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
659 40	0,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
660 40	0,990	40,990	1.000	19.32	19.32	4.70	4.70	354.66	354.66
1012 40	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1013 40	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1014 40	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1015 40	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1016 40	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1028 40	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63
1029 40	0,640	40,990	0.991	19.32	19.15	4.70	4.66	354.66	351.63

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY

FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
651	\$176,620

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 651	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
627	40,640	40,990	0.991	\$176,620	\$175,112
628	40,640	40,990	0.991	\$176,620	\$175,112
629	40,640	40,990	0.991	\$176,620	\$175,112
634	40,990	40,990	1.000	\$176,620	\$176,620
635	40,990	40,990	1.000	\$176,620	\$176,620
651	40,990	40,990	1.000	\$176,620	\$176,620
652	40,990	40,990	1.000	\$176,620	\$176,620
654	40,990	40,990	1.000	\$176,620	\$176,620
659	40,990	40,990	1.000	\$176,620	\$176,620
660	40,990	40,990	1.000	\$176,620	\$176,620
1012	40,640	40,990	0.991	\$176,620	\$175,112
1013	40,640	40,990	0.991	\$176,620	\$175,112
1014	40,640	40,990	0.991	\$176,620	\$175,112
1015	40,640	40,990	0.991	\$176,620	\$175,112
1016	40,640	40,990	0.991	\$176,620	\$175,112
1028	40,640	40,990	0.991	\$176,620	\$175,112
1029	40,640	40,990	0.991	\$176,620	\$175,112

^{*}Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 62

FOR BARRACKS WITH A/C - BUILDINGS 627, 628, 629, 634, 635, 651, 652 654, 659, 660, 1012, 1013, 1014, 1015, 1016, 1028, & 1029

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
651	\$181,928

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 651	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
627	40,640	40,990	0.991	\$181,928	\$180,374
628	40,640	40,990	0.991	\$181,928	\$180,374
629	40,640	40,990	0.991	\$181,928	\$180,374
634	40,990	40,990	1.000	\$181,928	\$181,928
635	40,990	40,990	1.000	\$181,928	\$181,928
651	40,990	40,990	1.000	\$181,928	\$181,928
652	40,990	40,990	1.000	\$181,928	\$181,928
654	40,990	40,990	1.000	\$181,928	\$181,928
659	40,990	40,990	1.000	\$181,928	\$181,928
660	40,990	40,990	1.000	\$181,928	\$181,928
1012	40,640	40,990	0.991	\$181,928	\$180,374
1013	40,640	40,990	0.991	\$181,928	\$180,374
1014	40,640	40,990	0.991	\$181,928	\$180,374
1015	40,640	40,990	0.991	\$181,928	\$180,374
1016	40,640	40,990	0.991	\$181,928	\$180,374
1028	40,640	40,990	0.991	\$181,928	\$180,374
1029	40,640	40,990	0.991	\$181,928	\$180,374

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

					2501011 0 44		DDO IFOT NO.	1406 011
		LOCATION:	Fort Leonard		REGION: 2 (Missouri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Energ	y Study, Insi	ulate Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INV	ESTMENT:	BLDG 651 - II	NSTALL 3.5"	BATT INSULATION	ON WALLS		
	Α.	CONSTRUCTION COS	T	=			\$156,301	
	В.	SIOH COST	(7.0	% of 1A) =			\$10,941	
	C.	DESIGN COST	(6.0	% of 1A) =			\$9,378	
	D.	TOTAL COST	(1A +	1B +1C) =			\$176,620	
	E.	SALVAGE VALUE OF	EXISTING EQU	JIPMENT =			\$0	
	F.	PUBLIC UTILITY COM	PANY REBATE	=			\$0	
	G.	TOTAL INVESTMENT	(10	O -1E -1F) =			>	\$176,620
2.	FNF	RGY SAVINGS (+) OR	COST (-):					
		E OF NISTIR 85-3273-		DISCOUNT	FACTORS:	JAN '96		
		ENERGY	FUEL COS	SAVINGS		DISCOUNT	DISCOUNTED	
		SOURCE	\$/MBTU (1) N			FACTOR (4)		
	Δ	ELECT.	\$7.33	18.23		13.80		
		DIST	\$0.00	0	\$0	0.00		
		NAT GAS	\$5.30	335.28		17.76		
		COAL	\$0.00	0	\$0	0.00		
		ELEC. DEMAND	, 5.55		\$334	13.47		
		TOTAL		353.51	\$2,245		>	\$37,901
3.	NON	I-ENERGY SAVINGS (+	-) OR COST (-)) 				
	Α.	ANNUAL RECURRING	(+ /-)					
		1 ANNUAL MAINTEN	ANCE		\$ O	14.88	\$0	
		2			\$O	14.88	\$0	
		3			\$ O	14.88	\$0	
		4 TOTAL ANNUAL D	ISC. SAVINGS	(+) / COST	\$0		\$0	
	В.	NON-RECURRING (+/	-)					
		ITEM	S	AVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
			C	OST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)	
						(TABLE A-2)	1	
		a. BASELINE EQUIP. R	EPLCMNT.	\$O			\$0	
		b.					\$0	
		c.					\$0	
		d.					\$0	
		e.					\$0	
		f. TOTAL		\$0			\$0	i
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+) OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	ST YEAR DOLLAR SAV	INGS (+) / CO	STS (-)	(2	F3 + 3A4 + (3Bf1/E	Economic Life))	\$2,245
5.	SIM	PLE PAYBACK (SPB) IN	YEARS (MUS	ST BE < 10 Y	(EARS TO QUALIFY)	(1G/4) =		78.69
6.	тот	AL NET DISCOUNTED	SAVINGS			(2F5 + 3C) =		\$37,901
7.	DIS	COUNTED SAVINGS-TO	D-INVESTMEN	T RATIO (SIF	R)	(6/1G) =		0.21
L		(MUST HAVE SIR > 1	.25 TO QUAL	IFY)				

Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure Figure F	ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	1	PF	-
ESTIMATION Cost Total Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreaus Moreau	PROJEC:		Limited Energy Study, Insulate Brick Buildings, Fort Le	eonard Woo	od, MO			DATE PRE	PARED	18-F	18-Feb-96
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BUILDING 651 INSTALL 3.5" BATT INSULATION ON WALLS INSTALL 3.5" BATT INSULATION ON WALLS INSTALL 3.5" BATT INSULATION ON WALLS ID INSTALL 3.5" BATT INSULATION S.F. 197860 \$50.20 \$53.96 \$2.0ARP 0.007 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51.00 \$51	S La	Item Refer		Unit of Measure	Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAI
IB-172 INSTALL 3-12" BATT INSULATION WALLS S.F. 20008 S.O.16 S.3.772 I-CARP O.007 S.	-		BUILDING 651								200
13-1/12 INSTALL 3-1/2* BATT INSULATION S.F. 20808.0 \$0.18 \$3,772 1.CARP 0.007 \$5. 15	2		INSTALL 3.5" BATT INSULATION ON WALLS								
IS-102 NISTALLI 3-102*BATT INSULATION S.F. 20808 0 \$6.02 \$5.3772 1-CARP 0.007 \$5 15 15 15 15 15 15 15	က										
B-1/2 INSTALL 2**L8*BATT NAPED 8 SANDED S1720 S1396 CARPP 0.007 S1	4										
INSTALL CRAMIC TILE, 4-14" x 4-14" TILE INSTALL CRAMIC SANNED S.F. 1978.6 \$0.20 \$ \$3.96 \$ 2-0.RPP 0.017 \$ \$17 \$17 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1 \$1	22	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	20808.0	\$0.18	\$3,772	1-CARP	0.007	\$3,827	\$7,598
ITCP INSTALL Z'AS TRODECO MAIL Z'OC STANDAL Z'OC STANDAL Z'AS TRODECO MAIL Z'OC STANDAL Z'AS TRODECO MAIL Z'OC STANDAL Z'AS TRODECO MAIL Z'OC STANDAL Z'AS TRODECO MAIL Z'OC STANDAL Z'AS TRODECO MAIL Z'OC STANDAL Z'AS TRODECO MAIL Z'OC STANDAL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL Z'AS TRODECO MAIL	9 1		INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	19798.0	\$0.20	\$3,966	2-CARP	0.017	\$17,685	\$21,651
170 NSTALL LOW CATE STAMLESS STEEL SHEIF EA, 60 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$10 \$1	_	MSI	INSTALL 2"x4" STUDDED WALL 2' OC	Ę.	12007.0	\$0.24	\$2,829	F-2	0.00	\$5,955	\$8,785
RELOGATE ENCRAIRES STEEL SHELF EA, 6.0 \$0.0 \$0.0 RELOGATE ENSEROARD RADIATION EA, 6.0 \$1.145 \$1.39 \$1.628 \$4.68 \$4.88 RELOGATE ENCRETCRICAL LIGHT SWITCH EA, 15.0 \$5.82 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248 \$1.248	∞ (ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	20808.0	\$0.07	\$1,390	1-PORD	0.01	\$5,022	\$6,412
RELOCATE GRASEBOARD RADATION EA, 99.0 \$18.39 \$1,821 Q-6 4.68 \$44 RELOCATE DRYER VENT EA, 6.0 \$11.3 1.6 1.3 RELOCATE DRYER VENT EA, 15.0 \$1.30 1.5 1.6 1.3 RELOCATE ELECTRICAL LIGHT SWITCH EA, 15.0 \$1.30 5.8 1.6 1.2 1.6 1.3 RELOCATE ELECTRICAL LIGHT SWITCH EA, 12.0 \$7.37 1.6 1.2 1.6 1.3 RELOCATE ELECTRICAL PAICE EA, 12.0 \$7.37 1.6 1.2 1.3 RELOCATE ELECTRICAL PAICE EA, 12.0 \$7.37 1.6 1.3 RELOCATE ELECTRICAL PAICE EA, 12.0 \$7.37 1.6 1.3 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 1.3 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL LIGHT SWITCH EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE ELECTRICAL PAICE EA, 13.0 \$7.00 1.6 RELOCATE PAICE EA, 13.0 \$7.00 1.6 RELOCATE EA, 13.0 \$7.00 1.6 RELOCATE EA, 13.0 \$7.00 1.6 RE	D (KZSSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	6.0	\$0.00	\$0 \$0	1-CARP	0.533	\$84	\$84
RELOCATE ELECTRICAL UGHT SWITCH	9	R6WMH	RELOCATE 6' BASEBOARD RADIATION	EA.	99.0	\$18.39	\$1,821	D-6	4.68	\$40,526	\$42,347
RELS RELOCATE ELECTRICAL LIGHT SWITCH EA. 15.0 \$8.82 \$132 1-ELEC 0.844 RELOCATE ELECTRICAL LIGHT SWITCH EA. 12.0 \$7.97 \$506 1-ELEC 0.856 REP RELOCATE ELECTRICAL PANEL EA. 1010.0 \$0.96 \$965 2-CARP 0.02 INSTALL GERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 2-TILE 0.084 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.83 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S.F. 1010.0 \$1.850 INSTALL CERAMIC TILE, 4.14" x 4.14" TILE S	-	RDV	RELOCATE DRYER VENT	EA.	0.9	\$11.45	69\$	1-CARP	1.3	\$205	\$274
REO RELOCATE ELECTRICAL OUTLET EA. 12.0 \$7.97 \$96 1-ELEC 0.896 1-ELEC 0.896 1-ELEC 12.191 1.996	12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	15.0	\$8.82	\$132	1-ELEC	0.844	\$385	\$518
NBE RELOCATE ELECTRICAL PANEL EA. 3.0 \$0.00 \$0	13	REO	RELOCATE ELECTRICAL OUTLET	EĄ.	12.0	\$7.97	\$96	1-ELEC	0.896	\$327	\$423
INSTALL 56" WATERPRE BRD - TAPED & SANDE S.F. 1010.0 \$0.96 \$965 2-CARP 0.02	4	REP	RELOCATE ELECTRICAL PANEL	EA.	3.0	\$0.00	\$0	1-ELEC	12.191	\$1,113	\$1,113
ICT INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE S.F. 1010.0 \$1.83 \$1,850 2-TILE 0.084 SUBTOTAL SUBTOTAL OH OVERHEAD PRO PROFIT SUBTOTAL OH OVERHEAD PRO PROFIT SUBTOTAL CONTINGENCY CONT CONTINGENCY CONTINGENCY TOTAL COST TOTAL COST	13	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	\$0.96	\$962	2-CARP	0.02	\$1,061	\$2,026
SUBTOTAL \$16.889 \$1 DIFF DIFFICULTLY FACTOR \$16.889 \$1 DIFF DIFFICULTLY FACTOR \$16.889 \$1 OH OVERHAD \$19.760 \$1 PRO PROFIT \$19.760 \$1 PRO PROFIT \$19.760 \$1 CONT CONTINGENCY \$4.347 \$1 TOTAL COST TOTAL COST \$20,003 \$1	16	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	\$1.83	\$1,850	2-TILE	0.084	\$4,109	\$5,959
SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL SUBTOTAL	17										
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SUBTOTAL \$16,889 \$ DIFF DIFFICULTLY FACTOR \$ SUBTOTAL \$16,889 \$ OH OVERHEAD \$19,760 PRO PROFIT \$19,760 SUBTOTAL \$21,736 \$1 CONT CONTINGENCY \$24,347 \$1 TOTAL COST \$20,837 \$2	26	The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s									
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OH OVERHEAD \$2,871 \$ SUBTOTAL \$19,760 \$ PRO PROFIT \$1,976 \$ SUBTOTAL \$21,736 \$ CONT CONTINGENCY \$4,347 \$ TOTAL COST \$26,083 \$	29		SUBTOTAL				\$16,889			\$84,316	\$101,205
SUBTOTAL \$19,760 \$1 \$10,000 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$1,976 \$	30	ОН	OVERHEAD			17%	\$2,871			\$14,334	\$17,205
PRO PROFIT \$1,976 \$1 SUBTOTAL \$21,736 \$1 CONT CONTINGENCY \$4,347 \$2 TOTAL COST \$26,083 \$1	31		SUBTOTAL				\$19,760			\$98,650	\$118,410
SUBTOTAL \$21,736 \$1 CONT CONTINGENCY \$4,347 \$1 TOTAL COST \$26,083 \$1	32	PRO	PROFIT			10%	\$1,976			\$9,865	\$11,841
CONT CONTINGENCY	ဗ္ဗ		SUBTOTAL		:	:	\$21,736			\$108,515	\$130,251
TOTAL COST \$26,083 \$26,083	8		CONTINGENCY			20%	\$4,347			\$21,703	\$26,050
	35		ST				\$26,083			\$130,218	\$156,301

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

			ENERG	Y CONSERV	ATION INVESTMENT	PROGRAM (ECIP)		
		LOCATION:	Fort Leonard	Wood	REGION: 2 (Missouri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Energ	y Study, Insi	ulate Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INV	ESTMENT:	BLDG 651 - 1	NSTALL 1.5'	RIGID INSULATION	ON WALLS		
``		CONSTRUCTION COS		=			\$160,998	
		SIOH COST		0% of 1A) =			\$11,270	
		DESIGN COST		0% of 1A) =			\$9,660	
		TOTAL COST	•	-1B +1C) =			\$181,928	
		SALVAGE VALUE OF	•	•			\$0	
	_	PUBLIC UTILITY COM					\$0	
		TOTAL INVESTMENT		D -1E -1F) =				\$181,928
2	FNF	RGY SAVINGS (+) OF	R COST (-)·					
-		TE OF NISTIR 85-3273		R DISCOUNT	FACTORS:	JAN '96		
		ENERGY	FUEL COS	SAVINGS	ANNUAL \$	DISCOUNT	DISCOUNTED	
		SOURCE	\$/MBTU (1) I	-		FACTOR (4)		
	Δ	ELECT.	\$7.33	19.32	\$142	13.80		
		DIST	\$0.00	0	\$O	0.00	-	
		NAT GAS	\$5.30	354.66	\$1,880	17.76		
		COAL	\$0.00	0	\$0	0.00		
	Ε.		, 0.00	•	\$349	13.47		
İ	F.			373.98	\$2,370		>	\$40,035
3.		N-ENERGY SAVINGS (ANNUAL RECURRING 1 ANNUAL MAINTEN	i (+/-)		\$ 0		\$0	
		2			\$ O		\$0	
		3			\$0		\$0	
		4 TOTAL ANNUAL D	ISC. SAVINGS	(+) / COST	\$ O		\$0	
	В.	NON-RECURRING (+	'-)					
		ITEM		SAVINGS (+)		DISCOUNT		
			(COST(-) (1)	OCCURRENCE (2)		SAVINGS/COST (4)	
						(TABLE A-2		
		a. BASELINE EQUIP. R	EPLCMNT.				\$0	
		b.					\$0	
		c.					\$0	
		d.					\$0	
		e.					\$0	
	_	f. TOTAL		\$0			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (-) OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	ST YEAR DOLLAR SAV	'INGS (+) / CC	STS (-)	(2	F3+3A4+(3Bf1/I	Economic Life))	\$2,370
5.	SIM	PLE PAYBACK (SPB) II	N YEARS (MUS	ST BE < 10 Y	EARS TO QUALIFY)	(1G/4) =		76.76
6.	тот	AL NET DISCOUNTED	SAVINGS			(2F5 + 3C) =		\$40,035
7.	DIS	COUNTED SAVINGS-T	O-INVESTMEN	T RATIO (SIR	1)	(6/1G) =		0.22
L		(MUST HAVE SIR >	1.25 TO QUAL	IFY)				

ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST		į			SHEET	-	PO	_
PROJEC		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Woo	od, MO			DATE PREPARED	EPARED	18-F	18-Feb-96
ENGINEER	<u></u>	E M C Engineers, Inc.					ESTIMATOR	JR.	o.	D. Sinz
		Denver, CO					CHECKED BY) BY	Ā	A. Niemeyer
•				MA	MATERIAL COST	ST	٦	ABOR COST	T:	
S Lae	Item Keter Code	Item Description	Unit of	Organtity	Cuit	Total	Crew/	Hours/	7.040	I V
-		BUILDING 651	Dipon	Guarrilly	COST	Otal	WOINE		lotal	1018
2		INSTALL 1.5" RIGID INSULATION ON WALLS								
က										
4 u	14 4/201	INCTALL 4 4 PER CICIO INC. II ATION	L	00000						
ဂ ဖ	באלו-יו	INSTALL I-1/2 RIGID INSULATION INCTALL 1/0" DEVIATOR - TABLE - CANDED	Т.	20808.0	\$0.59	\$12,308	1-CARP	0.008	\$4,373	\$16,681
0 ~	Z Z	INSTALL 1/2 DRIVVALL - I APED & SANDED	, V. F.	19/98.0	\$0.20	\$3,966	2-CARP	0.017	\$17,685	\$21,651
- α	a L	INSTALL DAYS COATS OF BAINT ON DESCRIPTION	ا .	20000	#0. B	0164	1-CARP	0.016	\$2,004	\$2,913
<u></u>	R2SSS	RELOCATE 2'STAINI ESS STEEL SHELF	о. П.	200002	\$0.04 \$0.00	085,14	1-PORD	0.01	\$5,022	\$6,412
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	Σ Δι		44.00	# 00 P	۲ ۲۲۲۲ -	0.555	404	404
1	RDV	RELOCATE DRYER VENT	<u> </u>	9.09	\$11.45	469	1-CARP	7 7	\$40,320	442,347
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	E.	15.0	\$8.82	\$132	1-ELEC	0.844	\$385	\$518
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	12.0	\$7.97	\$96	1-ELEC	0.896	\$327	\$423
4	REP	RELOCATE ELECTRICAL PANEL	EĄ.	3.0	\$0.00	\$0	1-ELEC	12.191	\$1,113	\$1,113
15	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	\$0.96	\$962	2-CARP	0.02	\$1,061	\$2,026
16	ဌ	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	\$1.83	\$1,850	2-TILE	0.084	\$4,109	\$5,959
17							-			
9					7					
19										
20										
21					The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s					
22										
23										
24			:	-						
26										
27		SUBTOTAL				\$23 505			\$78 808	6100 404
28	DIFF	DIFFICULTLY FACTOR			2%	2001011			\$3.845	\$3.845
29		SUBTOTAL				\$23.505			\$80.741	\$104 246
တ္ထ	공	OVERHEAD			17%	\$3,996		7 77	\$13.726	\$17,722
31		SUBTOTAL				\$27,501			\$94,467	\$121,968
32	PRO	PROFIT	1		10%	\$2.750			\$9 447	\$12 197
33		SUBTOTAL				\$30,251			\$103,914	\$134,165
34	CONT	CONTINGENCY		:	20%	\$6,050			\$20,783	\$26,833
35	TOTAL COST)ST		:		\$36,301			\$124,697	\$160,998

E M C ENGINEE	RS, INC.					DATE:	Feb-96
PROJECT: LIMITED EN	RGY STUDY, INSULATE I	BRICK BUIL	DINGS			BY:	
CLIENT CONTRACT NO.	: DACA 01-94D-0033					JOB:	1406.011
							1406.011
LOCATION: FT LEONAR	ND WOOD, MO.					СНК:	AJN
						FILE:	651BHL
ј В	UILDING HEATING	LOAD C	ALCULA	TION SHE	FT		
BLDG NO: 651	BLDG NAME:				-•		
BLDG FUNCTION:	BEDG NAME.	BANNACI	(S WITH A				
FLOOR AREA: (SQ. FT)	40,986					# FLOORS	3
SLAB PERIMETER: (FT)	514	- 					
L AREAS: ([] FIFED V	ERIFIED ELEVATION PLAN	IC)					
/	CIMILED CELVATION FEAR	NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS	(SQ. FT)	9,088	9,088	1,845	1,845	21,866	
GLASS	(SQ. FT)	467	435	17	19	938	
PERSONNEL DOOR INSULATED PANEL	(SQ. FT)	80	40	0	0	120	
WALLS, NET	(SQ. FT) (SQ. FT)	8,308	217 8,396	1 910	9	468	
	G AREA IF ATTIC IS UNCO			1,819	1,817 (SQ. FT)	20,341 13,662	
INSULATED PANEL	(SQ. FT)	· · · · · · · · · · · · · · · · · · ·	PERSONN	EL DOOR	(SQ. FT)	13,862	
BASEMENT WALLS	(SQ. FT)	0	0	0		0	
II. CONSTRUCTION: ([] FIELD VERIFIED WALL, I	ROOF, WIN	DOW, DO	OR TYPES)			
WALLS: (SKETCH CROS	S SECTION OF WALL)			C	OMPONEN	TS	R-VALUE
					OUTSIDE		0.17
					4" FACE		0.43
						9" L.W. CONC.	0.91 3.00
				5.		2.777. 00.110.	0.00
				6.			
				7.	INSIDE AI		0.68
					TOTAL	R-WALL = U = 1/R	5.19
					<u> </u>	U= 1/R	0.193
ROOF: (SKETCH CROSS	SECTION OF ROOF)			C	OMPONEN'	TS	R-VALUE
					OUTSIDE		0.17
					BUILT UP		0.34
					2" INSULA 7" L.W. C		8.00 6.25
				5.	,	ONO.L.	0.23
				6.			
				7.	INSIDE AII		0.68
						-ROOF = U=1/R	15.44 0.065
						- ''''	0.065
GLASS TYPE:	PPG 'PENNVERNO	ON' C.L. T	WNDV, SS.	A, .88 S.C.		R-GLASS	1.61
SLAB TYPE FLOOR: BASEMENT TYPE:	CEMENT					SLF	0.83
INSULATED PANEL:	NONE					R-BASEM. R-PANEL	0.00
PERSONNEL DOOR TYPE:	METAL					R-PANEL R-PDOOR	4.20 2.56
III. INFILTRATION:					L	230.1	2.50
TIGHT WALL H/M/L (SQ.F	T.)		X CFM /	SQ.FT.	0.042	=	
AVG. WALL H/M/L (SQ.F)		21866	X CFM /		0.138	=	3,018
LEAKY WALL H/M/L (SQ.F			X CFM /		0.000	=	0
DOOR OPENINGS / HR - S DOOR OPENINGS / HR - D		50		OPENING /HR	1.600	=	80
COOR OF LININGS / FIR - D	OUBLE DOURS	50		OPENING /HR ILTRATION (CF	1.385	=	69
LIA SALES	M					=	3167
UA PANEL UA PDOOR	PANEL AREA	468		X PANEL "U"	0.238	=	111
UA WALL	PDOOR AREA WALL AREA	120 19,873		X DOOR "U" X WALL "U"	0.391	=	47
UA ROOF	ROOF AREA	13,662		X ROOF "U"	0.193 0.065	= =	3,917 885
UA GLASS	GLASS AREA	938		X GLASS "U"	0.621	=	582
UA SLAB	SLAB PERIM.	514		X SLF	0.830	=	427
UA BASEM. INFILTRATIO	B-WALL AREA	0		X BASE. "U"	0.000	=	0
INFILITATIO	N CFM	3167		X A. T. F.	1.035	=	3,278

TOTAL UA (BTU/HR°F)

9,247

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96

PREPARED BY: DMS

CHECKED BY: FILE: BLDG: AJN

651ZN1 651

ZONE:



	Rat	es of I	Heat Gain from Occupants of Co	nditioned Spaces				
Zone No.	People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat.
1	125	4	Seated, light work, typing	Offices, hotels, a	250	200	31,250	25,000
тот	125							
101	125					TOTAL	31,250	25,000

Peak Wattage Value for Lights											
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage						
1	18	5	Fluorescent, 1 - 34w lamp, 16w ballast (1x4 ft. fixture)	50	900						
	76	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	6,384						
1 1	64	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	10,752						
	102	18	Incandescent - 60w	60	6,120						
707											
TOT	260			TOTAL	24,156						

			Peak Value for Internal Gains				
Zone No.	No. of Equipment		Description	Average Wattage	Heat Gain to Space(%)	Total Wattag	Total (BTU)
1	6	68	Washing Machine (Automatic)	512	20%		10,485
	6	23	Clothes Dryer	4,856	45%		99,441
}							
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Ī					· · · · · · · · · · · · · · · · · · ·	****	
- }							
				TOTAL	43%	32,208	109,926

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

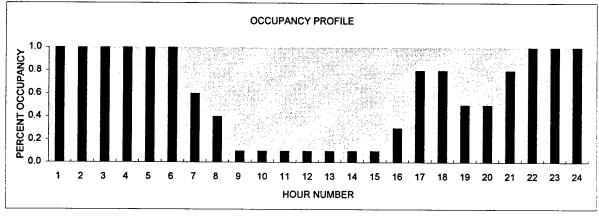
26-Jan-96 PREPARED BY: DMS

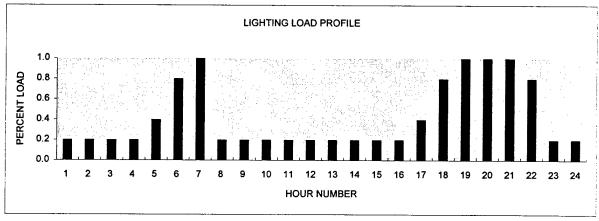
CHECKED BY: FILE:

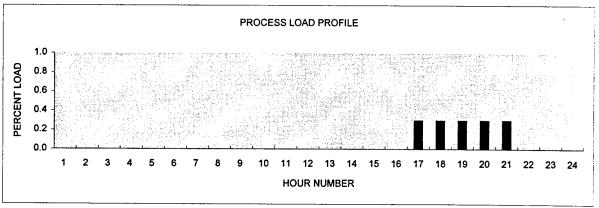
AJN 651ZN1

BLDG:	651
ZONE:	

BLDG	BLDG	TYPE OF		HOUR NUMBER																						
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Barracks	OCCUPANC	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.8	0.8	0.5	0.5	0.8	1.0	1.0	1.0
	1	LIGHTING	0.2	0.2	0.2	0.2	0.4	8.0	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.8	1.0	1.0	1.0	0.8	0.2	0.2
		PROCESS			0.0										0.0											







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BLDG 651 - BARRACKS WITH A/C - BASELINE
 ----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
                                              1
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -891200.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE
 .670 .670 .670
                              .670 .670
                                                  .670
                                                            .670
                                                                        .670
      1.00 1.00 1.00 1.00 1.00
1.00 .670 .670 .670 .670
 1.00
                                                             1.00
                                                                       1.00
 1.00
                                                                        .670
                                                             .670
A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG)
                            30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
```

	WALL DATA								
WALL NUMBER	1	2	3	4					
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00					
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0					
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2					
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0					
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7					
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5					
OVERHANG HGT ABV WNDW (HOH)	1.0	1.0	1.0	1.0					

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.194	.193	.194	.194
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.01454	.01447	.01454	.01454
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00002	.00002	.00002	.00002
N=2	.00224	.00223	.00224	.00224
N=3	.00805	.00801	.00224 .00805	.00805
N=4	.00394	.00392	.00394 .00029 ******	.00394
N =5	.00029	.00029	.00029	.00029
N=6	******	*****	******	*****
NUMBER OF DN FACTORS (ND)	5	5	5	5
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
DN FACTORS N=1 N=2 N=3 N=4 N=5 N=6	*****	*****	*****	*****
ROOF AREA SQFT (AROF) 13662	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 6.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.0784	09E-03		
ROOF B TRANSFER FUNCTIONS (BNR)			
.000 .111E-03 .561E-03	.369E-03	.369E-04	738.	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.46 .533 .	611E-01	.820E-03	999.	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0 SKYLIGHT WIDTH FT (SKW) 0.00	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKO	00000E+00	000000		
OVERHANG HEIGHT ABOVE SKYLIGHT	W) U.U	00000E+00		
	1	0.0000	00E+00	
SKYLIGHT SHADING COEFFICIENT (S	ים או או די ד	0000000	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST	.000000E+01	1	-
SUMMER END MONTH AND DAY FOR SH	ISK (MND N	(ממה)	7	1
SKY LIGHT AREA SQFT (ASKY)	0.000000E+	00	1	1
DAYTIME SKY LIGHT U BTU/SOFT-HE	R-F (SKYU)	1 3	292998	
DAYTIME SKY LIGHT U BTU/SQFT-HE NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKY	JN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPA	CE (FAP)	4.300000F	-01

THERMOSTAT SET POINT DEG F KW - - - - - BTU/HR - - - - -PEOPLE PEOPLE PROCESS SENSIBLE LIGHTS LATENT HEATING COOLING PEAK VAL 24. 47268. 31250. 25000. HOUR - - - - HOURLY FRACTION OF PEAK - - - -1 .200 .000 1.000 1.000 72.0 76.0 2 .200 1.000 .000 1.000 72.0 76.0 3 .200 .000 1.000 1.000 72.0 76.0 .000 4 .200 1.000 1.000 72.0 76.0 5 .400 .000 1.000 1.000 72.0 76.0

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-----INTERNAL GAINS AND PROFILES -----

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72.0

72.0

76.0

76.0

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               .200
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   16
               .400
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   22
              .800
                                                                     72.0
                                                                                   76.0
                       .000
                            .000 1.000 1.000 72.0
.000 1.000 1.000 72.0
   23
                                                                                   76.0
                .200
   24
                .200
                                                                                  76.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 68.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                                           68.000000
SYSTEM TYPE, (IECN) 9
SUPPLY AIR CFM (SACFM) 27148.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR
                                          0.00000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.000000
SYSTEM MIXED AIR TEMP(TMXAIR) 55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.000000E-01
                        1
VAV TYPE (IVAV)
VAV MINIMUM SUPPLY AIR FRACTION (ARMIN) 2.500000E-01
VAV COLD DECK TEMPERATURE F (TCD) 58.000000
VAV FAN PART LOAD FACTORS
         .560 .200
 .000
                                      .560 .300
                                                              .620
                                                                          .400
                                                                                        .700
          .770 .600 .830 .700
.980 1.00 1.00
 .500
                                                               .880
                                                                            .800
                                                                                         .930
 .900
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 2125000.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
         .191 .200 .286 .300 .369
.100
                                                                                          .451
                                                                           .400
             .537
 .500
                         .600
                                      .625
                                                   .700
                                                               .718
                                                                           .800
                                                                                          .812
.900 .906 1.00 1.00
CHILLER TYPE (ITYPCH) 0
COOLING PLANT RATED OUTPUT BTU (CFLOT) 892000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 164905.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
 .100 .200 .200 .250 .300 .310
                                                                          .400
                                                                                        .370
                         .600
 .500
            .450
                                      .550
                                                  .700
                                                              .650
                                                                            .800
                                                                                         .760
 .900
           .880
                       1.00 1.00
```

BLDG 651 - BARRACKS WITH A/C - BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	N				
			SOLAR		DOOR				VENT	
			THRU		AND				AND	
	H LOAD				SLAB					LATENT
JAN			14.		0.				0.	
	-506.	LOSS		-27.	-1.	0.	-95.	-14.	-445.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-418.	LOSS		-24.			-72.			0.
MAR	1.		21.	0.	0.	0.	4.	Ο.	0.	0.
	-354.	LOSS		-20.	-1.	0.	-59.	-11.	-349.	0.
APR	15.	GAIN		0.		0.	12.	0.	2.	6.
	-163.	LOSS		-12.	-1.	0.	-29.	-7.	-203.	0.
MAY	55.	GAIN	23.	0.	0.	Ο.	22.	ο.	5.	22.
	-38.	LOSS		-5.	0.	0.	-11.	-4.	-110.	0.
JUN	201.	GAIN	23.	1.	0.	Ο.	32.	1.	13.	115.
	-1.	LOSS		-1.	Ο.				-49.	0.
JUL	303.	GAIN	23.	3.	0. 0.	0.	44.	2.	34. -28.	163.
	0.	LOSS		0.	0.	0.	-2.	-1.	-28.	0.
AUG	275.	GAIN	20.	2.	0.	Ο.	37.	1.	24.	156.
	-1.	LOSS		0.	0.	0.	-2.	-1.	-30.	0.
SEP	152.	GAIN	17.	0.	0.	0.	22.	1.	13.	89.
	-44.	LOSS		-4.	0.	0.	-10.	-3.	-87.	0.
OCT	21.		16.	0.	0.	0.	7. -31.	Ο.	2.	10.
	-153.	LOSS		-12.	-1.	0.	-31.	-6.	-187.	0.
NOV	2.			0.	0.	Ο.	2.	0.	0.	1.
	-273.	LOSS		-18.	-1.	0.	-55.	-9.	-273.	0.
DEC	0.				0.	Ο.	0.	0.	0.	0.
	-496.	LOSS		-28.	-1.	0.	-95.	-14.	-428.	0.
TOT	1025.	GAIN	218.	6.	0.	Ο.	180.	4.	92.	561.
	-2448.	LOSS		-154.	-8.	0.	-465.		-2569.	0.
XAM	HEATING	LOAD=	-1457	619. BT	TUH ON E	EC 18 F	HOUR 9	AMB:	IENT TEM	2 3.
									IENT TEM	

ZONE UA BTU/HR-F 5551.3

97.00 60.18 39.55 563.03

BLDG 651 - BARRACKS WITH A/C - BASELINE

YEAR

	_								FAN TO	TAL
INTERNA		ד מזמכ	SPACE			COTN	LIGHTING	DDOCECC	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND			
MONTH						AMBT.		BTU	BTU	BTU
JAN	72.	73.	72.	_			8.24	5.11	2.94	47.40
FEB	72.	74.	72.	9 28			7.44	4.62	2.65	42.81
MAR	72.	77.	72.		23 10		8.24	5.11	2.94	47.40
APR	73.	77.	72.				7.97	4.95	2.89	45.92
MAY	74.	77.	72.				8.24	5.11	3.26	47.72
JUN	76.	77.	72.	23 19	9 6	71. 59.	7.97	4.95	3.72	46.74
JUL	76.	77.	73.		18 6	91. 60.	8.24	5.11	4.72	49.18
AUG	76.	77.	72.	6 26	5 7		8.24	5.11	4.18	48.64
SEP	75.	77.	72.	_		73. 68.	7.97	4.95	3.49	46.51
OCT	73.	77.	72.	_			8.24	5.11	2.98	47.44
NOV	72.	77.	72.	8 21		72. 68.	7.97	4.95	2.84	45.87
DEC	72.	72.	72.		24 15		8.24	5.11	2.94	47.40

BLDG 651 - BARRACKS WITH A/C - BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	N MAXIMUM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	вт	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	740	744	0	0	1360E+07	.0000
FEB	658	672	0	0	1225E+07	.0000
MAR	671	744	2	0	1274E+07	.2883E+06
APR	436	720	3	0	7666E+06	.3302E+06
MAY	184	744	0	0	4968E+06	.5460E+06
JUN	14	720	0	0	2036E+06	.8547E+06
JUL	0	744	0	21	.0000	.8912E+06
AUG	13	744	0	0	2271E+06	.8638E+06
SEP	186	720	4	2	4449E+06	.8912E+06
OCT	475	744	7	0	6624E+06	.4621E+06
NOV	633	720	5	0	9277E+06	
DEC	744	744	3	0		.2627E+06
YEAR	4754	8760	24	-	1458E+07	.0000
	-,54	0,00	24	23	1458E+07	.8912E+06

BEACON Energy Analysis By EMC Engineers, Inc.

651.I

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	THE FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	716.20	.00	8.24	5.11	2.03	47.40	26.9
FEB	602.55	.00	7.44	4.62	1.84	42.81	26.9
MAR	537.85	.07	8.24	5.11	2.03	47.40	42.2
APR	280.24	.91	7.97	4.95	1.98	45.92	44.4
MAY	86.06	3.01	8.24	5.11	2.10	47.72	55.0
JUN	5.30	10.17	7.97	4.95	2.15	46.74	74.1
JUL	.00	15.51	8.24	5.11	2.38	49.18	77.1
AUG	4.98	13.84	8.24	5.11	2.29	48.64	74.7
SEP	93.32	7.66	7.97	4.95	2.10	46.51	76.4
OCT	278.16	1.14	8.24	5.11	2.04	47.44	49.5
NOV	442.93	.10	7.97	4.95	1.97	45.87	39.9
DEC	706.60	.00	8.24	5.11	2.03	47.40	26.9
YEAR	3754.18	52.40	97.00	60.18	24.96	563.03	77.1

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 107585. BTU/(SQFT-YEAR)

BLDG 651 - BARRACKS WITH A/C - BASELINE

OTHER MONTHLY STATISTICS

				OTH	ER MONTH	LY S'	TATIST	ICS		
	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					MOTTO	0 53337033	143	
	SURF.	SURF.		70.77	MAN GIVE			S WHEN	MAXIMUM	
				AVG.	MAX SYS			M LOADS	COOLING	HEATING
	BTU/	BTU/		MBT.	TEMP. D			MET	LOAD	LOAD
	SQFT-	SQFT-	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1360E+07
				55.	٠.	٠.	Ü	U	.0000	1360E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	1225E+07
MAR	1922.	1054			_					
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2883E+06	1274E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.3302E+06	7666E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.5460E+06	4968E+06
JUN	2647.	1993.	1.000	72.	0.	ο.	0	0	.8547E+06	2036E+06
								-		120002.00
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.8912E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	06207.06	00010 06
		2020,	2.000	70.	0.	0.	U	U	.8638E+U6	2271E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.8912E+06	4449E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	4601E.06	CC04E 0C
			2.000	57.	٠.	0.	U	U	.4621E+U6	6624E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2627E+06	9277E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	14505.05
					٠.	٠.	U	U	.0000	1458E+07

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BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK******
  FILE NAME MO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
 FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -891200.000000
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE

    .670
    .670
    .670
    .670
    .670

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    .670
    .670
    .670
    .670

  .670
                                                                                 .670
 1.00
                                                                                 1.00
 1.00
                                                                                 .670
A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                      WALL DATA
                                      1 2
WALL NUMBER
AZIMUTH ANGLE (AZ)
                                       .00
                                                 90.00 180.00 -90.00
WALL AREA SQFT (AWLL)
                                  8613.0 1828.0
435.0 18.5
                                                            8541.0 1826.0
WINDOW AREA SQFT (AWND) 435.0 18.5 467.0 17.2 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 43.5 1.9 46.7 1.7 WIDTH OF OVERHANG (WOH) 2.5 2.5 2.5 2.5 OVERHANG HGT ABV WNDW (HOH) 1.0 1.0 1.0 1.0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.060	.060	.060	.060
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000 .00015	.00000
N=2	.00015	.00015	.00015	.00015
N=3	.00081	.00081	.00081	.00081
N=4	.00062	.00062	.00062	.00062
N=5	.00008	.00008	.00008	.00008
N=6	*****	******	*****	*****
N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND) DN FACTORS	6	6	6	6
N=1 N=2 N=3 N=4	1.00000	1.00000	1.00000	1.00000
N=2	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728	.00728
N=6		00002	00002	00002
ROOF AREA SQFT (AROF) 13662				
ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF TRANS FUNCTIONS USED (1=Y)			1	
ROOF C TRANSFER FUNCTION (CNR)		09E-03		
ROOF B TRANSFER FUNCTIONS (BNR				
.000 .111E-03 .561E-03		.369E-04	738.	
ROOF D TRANSFER FUNCTIONS (DNR	•			
1.00 -1.46 .533			999.	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES SKYLIGHT HEIGHT FT (SKH) 0.0			000	
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO		000000		
OVERHANG HEIGHT ABOVE SKYLIGHT			005.00	
SKYLIGHT GLASS NUMBER (NS)		0.0000	00E+00	
SKYLIGHT SHADING COEFFICIENT (S		0+300000E+0	0	
				1
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SE	HSK (MND.N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)			_	-
DAYTIME SKY LIGHT U BTU/SQFT-HE			292998	
NIGHT TIME SKYLIGHT U BTU/SOFT.	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	rernal spa	CE (FAP)	4.300000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	HC	URLY FRACT	TION OF PE	AK		
1	.200	.000	1.000	1.000	72.0	76.0
2	.200	.000	1.000	1.000	72.0	76.0
3	.200	.000	1.000	1.000	72.0	76.0
4	.200	.000	1.000	1.000	72.0	76.0
5	.400	.000	1.000	1.000	72.0	76.0
6	.800	.000	1.000	1.000	72.0	76.0
7	1.000	.000	.800	.800	72.0	76.0
8	.200	.000	.400	.400	72.0	76.0

9	.200	.000	.100	100	70.0		76.0
10	.200	.000	.100	.100 .100	72.0		76.0
11	.200	.000			72.0		76.0
12			.100	.100	72.0		76.0
	.200	.000	.100	.100	72.0		76.0
13	.200	.000	.100	.100	72.0		76.0
14	.200	.000	.100	.100	72.0		76.0
15	.200	.000	.100	.100	72.0		76.0
16	.400	.000	.300	.300	72.0		76.0
17	.800	.300	.800	.800	72.0		76.0
18	1.000	.300	.800	.800	72.0		76.0
19	1.000	.300	.500	.500	72.0		76.0
20	1.000	.300	.500	.500	72.0		76.0
21	1.000	.300	.800	.800	72.0		76.0
22	.800	.000	1.000	1.000	72.0		76.0
23	.200	.000	1.000	1.000	72.0		76.0
24	.200	.000	1.000	1.000	72.0		76.0
NO HEAT	ING ABOVE AMB						70.0
NO COOL	ING BELOW AMB	TENT TEMP	OF (TCLK)	OT) 6	8 000000		
	TYPE, (IECN)			31, 0	18.00000		
	AIR CFM (SACF	_	3.000000				
	ZER HIGH TEMP		68.00	2000			
	SUPPLY AIR ST.						
	SUPPLY AIR ST			0000E+00			
	MIXED AIR TEM			.000000			
				00000			
	SIDE AIR FRAC			1.000	000E-01		
	ICIENCY (EFAN		000E-01				
	AL PRESSURE I		(DP) 8.	.000000E-0	1		
	E (IVAV)	1					
	IMUM SUPPLY A	IR FRACTIC	N (ARMIN)				
		ATURE F		2.5000 58.0000			
	PART LOAD FA	ATURE F CTORS	(TCD)	58.0000	00		
.000	PART LOAD FA	ATURE F CTORS .200	(TCD)	58.0000	.620	.400	.700
.000 .500	PART LOAD FAG .560 .770	ATURE F CTORS .200 .600	(TCD) .560 .830	58.0000	00	.400	.700 .930
.000 .500 .900	PART LOAD FAG .560 .770 .980	ATURE F CTORS .200 .600 1.00	.560 .830 1.00	58.0000 .300 .700	.620 .880		
.000 .500 .900 HEATING	PART LOAD FAC .560 .770 .980 PLANT RATED C	ATURE F CTORS .200 .600 1.00 DUTPUT BTU	(TCD) .560 .830 1.00 (HFLOT) 1	58.0000 .300 .700	.620 .880		
.000 .500 .900 HEATING HEATING	PART LOAD FAC .560 .770 .980 PLANT RATED C	ATURE F CTORS .200 .600 1.00 DUTPUT BTU INPUT BTU	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2	.300 .700 .700000.00	.620 .880		
.000 .500 .900 HEATING HEATING	PART LOAD FAC .560 .770 .980 PLANT RATED C	ATURE F CTORS .200 .600 1.00 DUTPUT BTU INPUT BTU	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2	.300 .700 .700000.00	.620 .880		
.000 .500 .900 HEATING HEATING	PART LOAD FAC .560 .770 .980 PLANT RATED C	ATURE F CTORS .200 .600 1.00 DUTPUT BTU INPUT BTU	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2	.300 .700 .700000.00	.620 .880		
.000 .500 .900 HEATING HEATING	PART LOAD FAC .560 .770 .980 PLANT RATED C PLANT RATED D	ATURE F CTORS .200 .600 1.00 DUTPUT BTU INPUT BTU DAD VS FRA	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT	.300 .700 .70000.00 .125000.00	.620 .880 0000 0000 LH)	.800	.930
.000 .500 .900 HEATING HEATING HEATING	PART LOAD FAC .560 .770 .980 PLANT RATED C PLANT RATED D PLANT PART LO	ATURE F CTORS .200 .600 1.00 DUTPUT BTU INPUT BTU DAD VS FRA .200	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT	.300 .700 .700 .700000.00 .700000.00 .7 TABLE (P.	.620 .880 0000 0000 LH) .369	.800	.930 .451
.000 .500 .900 HEATING HEATING .100 .500	PART LOAD FAC .560 .770 .980 PLANT RATED C PLANT RATED D PLANT PART LO .191 .537	ATURE F CTORS .200 .600 1.00 DUTPUT BTU INPUT BTU DAD VS FRA .200 .600 1.00	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT .286 .625	.300 .700 .700 .700000.00 .700000.00 .7 TABLE (P.	.620 .880 0000 0000 LH) .369	.800	.930 .451
.000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING	PART LOAD FAGE .560 .770 .980 PLANT RATED COMPLANT RATED COMPLANT PART LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL L	ATURE F CTORS .200 .600 1.00 DUTPUT BTU DAD VS FRA .200 .600 1.00 DUTPUT BTU	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT .286 .625 1.00 0 (CFLOT)	58.0000 .300 .700 .70000.00 .125000.00 .TABLE (P. .300 .700	.620 .880 0000 0000 LH) .369 .718	.800	.930 .451
.000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING	PART LOAD FAGE .560 .770 .980 PLANT RATED COMPLANT RATED COMPLANT PART LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL L	ATURE F CTORS .200 .600 1.00 DUTPUT BTU DAD VS FRA .200 .600 1.00 DUTPUT BTU	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT .286 .625 1.00 0 (CFLOT)	58.0000 .300 .700 .70000.00 .125000.00 .TABLE (P. .300 .700	.620 .880 0000 0000 LH) .369 .718	.800	.930 .451
.000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING	PART LOAD FAGE .560 .770 .980 PLANT RATED COMMANDER PLANT PART LOCAL .191 .537 .906 TYPE (ITYPCH) PLANT RATED COMPLANT RATED COM	ATURE F CTORS .200 .600 1.00 DUTPUT BTU INPUT BTU DAD VS FRA .200 .600 1.00 DUTPUT BTU	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT .286 .625 1.00 0 (CFLOT)	58.0000 .300 .700 .70000.00 .125000.00 .TABLE (P. .300 .700 .700	.620 .880 .880 .0000 .0000 LH) .369 .718	.800	.930 .451
.000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING	PART LOAD FAGE .560 .770 .980 PLANT RATED COMPLANT RATED COMPLANT PART LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL LOCAL L	ATURE F CTORS .200 .600 1.00 DUTPUT BTU DAD VS FRA .200 .600 1.00 DUTPUT BTU DAD FRAC V	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT .286 .625 1.00 0 (CFLOT) (CFLIN) S FRAC RAT	58.0000 .300 .700 .70000.00 .700000.00 .7TABLE (P. .300 .700 .892000.00 .164905.000	.620 .880 .880 .0000 .0000 LH) .369 .718	.400	.930 .451 .812
.000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING COOLING COOLING	PART LOAD FAGE .560 .770 .980 PLANT RATED COMMENT PART LOCAL .191 .537 .906 TYPE (ITYPCH) PLANT RATED COMPLANT RATED COMPLANT RATED COMPLANT RATED COMPLANT PART LOCAL .200	ATURE F CTORS .200 .600 1.00 DUTPUT BTU DAD VS FRA .200 .600 1.00 DUTPUT BTU DAD FRAC V .200	(TCD) .560 .830 1.00 ((HFLOT) 1 (HFLIN) 2 C OF INPUT .286 .625 1.00 0 (CFLOT) (CFLOT) (CFLIN) S FRAC RAT	58.0000 .300 .700 .700000.00 .700000.00 .7 TABLE (P. .300 .700 .892000.00 .164905.000 .200 COP (P. .300	.620 .880 .880 .0000 .0000 LH) .369 .718	.400	.930 .451 .812
.000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING COOLING	PART LOAD FACE .560 .770 .980 PLANT RATED COMMENT PART LOCAL .191 .537 .906 TYPE (ITYPCH) PLANT RATED COMPLANT RATED COMPLANT RATED COMPLANT RATED COMPLANT RATED COMPLANT PART LOCAL	ATURE F CTORS .200 .600 1.00 DUTPUT BTU DAD VS FRA .200 .600 1.00 DUTPUT BTU DAD FRAC V	(TCD) .560 .830 1.00 (HFLOT) 1 (HFLIN) 2 C OF INPUT .286 .625 1.00 0 (CFLOT) (CFLIN) S FRAC RAT	58.0000 .300 .700 .70000.00 .700000.00 .7TABLE (P. .300 .700 .892000.00 .164905.000	.620 .880 .880 .0000 .0000 LH) .369 .718	.400	.930 .451 .812

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	TN				
			SOLAR		D00	R			VENT	
			THRU		AND	1			AND	
MNT	H LOAD					BSMT	WALL	WINDOW	INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-436.	LOSS		-27.	-1.	0.	-29.	-14.	-441.	0.
FEB	0.	GAIN	16.	0.		0.	0.	ο.	0.	0.
	-365.	LOSS		-24.	-1.	0.	-22.	-12.	-378.	0.
MAR	1.		21.			0.	0.	0.	0.	Ο.
	-312.	LOSS		-20.	-1.	0.	-17.	-11.	-346.	0.
APR	12.		20.	0.	0.	0.	2.	Ο.	2.	5.
	-145.	LOSS		-12.	-1.	0.	-7.	-6.	-201.	0.
MAY	49.		23.				5.	0.	4.	23.
	-34.	LOSS		-5.	0.	0.	-1.	-4.	-108.	0.
JUN		GAIN	23.		0.		9.			
	-1.	LOSS		-1.	0.	0.	0.	-2.	-47.	0.
JUL		GAIN	23.	3.	0.	0.	13.	2.		
	0.	LOSS		0.	0.	0.	0.	-1.	-27.	0.
AUG		GAIN	20.		0.		11.	1.	23.	149.
	-1.	LOSS		0.	0.	0.	0.	-1.	-29.	0.
SEP	140.	GAIN	17.				6.		13.	88.
	-39.	LOSS					-2.	-3.	-86.	0.
OCT	19.		16.	0.	0. -1.	0.	1.	Ο.	2.	10.
	-133.	LOSS		-12.	-1.	0.	-8.	-6.	-185.	0.
NOV	1.						0.		0.	1.
	-234.	LOSS		-18.	-1.	0.	-16.	-9.	-272.	0.
DEC							0.			0.
	-426.	LOSS		-28.	-1.	0.	-29.	-14.	-425.	0.
	920.						46.			
	-2127.	LOSS		-153.	-8.	0.	-132.	-83.	-2546.	0.
MAX	HEATING	LOAD=	-1254	901. E	TUH ON	DEC 18	HOUR 2	AMB:	ENT TEM	P 3.
MAX	COOLING	LOAD=	884	639. E	NO HUTE	JUL 14	HOUR 17	AMB	ENT TEM	P 92.

ZONE UA BTU/HR-F 2764.9

BEACON Energy Analysis By EMC Engineers, Inc. 651FG.I

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

	_								FAN T	OTAL
INTERN										
			SPACE			COIN-		PROCESS		HEAT GAIN
			URE F MIN			CIDENT AMBT.		MILLION BTU		MILLION BTU
JAN	72.	73.	72.	4 31		64. 33.	8.24	5.11	2.94	47.40
FEB	72.	74.	72.			66. 34.	7.44	4.62	2.65	42.81
MAR	72.	77.	72.			68. 32.	8.24	5.11	2.94	47.40
APR	73.	77.	72.	-		74. 60.	7.97	4.95	2.85	45.87
MAY	74.	77.		31 3		67. 66.	8.24	5.11	2.99	47.45
JUN	76.	77.	72.			67. 59.	7.97	4.95	3.18	46.21
JUL	76.	77.	73.			67. 57.	8.24	5.11	3.93	48.39
AUG	76.	78.	72.		5 7	67. 60.	8.24	5.11	3.58	48.04
SEP	75.	77.	72.				7.97	4.95	3.15	46.17
OCT	73.	77.	72.	6 31		71. 44.	8.24	5.11	2.95	47.41
NOV	72.	77.	72.	8 21		68. 68.	7.97	4.95	2.84	45.87
DEC	72.	72.	72.				8.24	5.11	2.94	47.40
YEAR							97.00	60.18	36.95	560.42

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF F	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WERE	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	735	744	0	0	1177E+07	.0000
FEB	661	672	0	0	1070E+07	.0000
MAR	676	744	0	0	1103E+07	.2692E+06
APR	442	720	0	0	6380E+06	.3180E+06
MAY	184	744	0	Ō	4209E+06	.4276E+06
JUN	13	720	0	0	1752E+06	.7370E+06
JUL	0	744	0	0	.0000	.8846E+06
AUG	10	744	0	0	1974E+06	.7292E+06
SEP	191	720	0	0	3830E+06	.8104E+06
OCT	478	744	0	0	5727E+06	.3963E+06
NOV	619	720	3		7804E+06	
DEC	741	744	0	0		.2610E+06
YEAR	4750	8760	-		1255E+07	.0000
	4/30	0/00	3	0	1255E+07	.8846E+06

SYSTEM TOTALS

			CONSUMPTI	OIN	10	OTAL INTERNAL	MAXIMUM
			IGHTING	PROCESS	FANS	HEAT GAIN	ELECTRIC
				MILLION	THOUSAND	MILLION	DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN 6	40.30	.00	8.24	5.11	2.03	47.40	26.9
FEB 5	45.37	.00	7.44	4.62	1.84	42.81	26.9
MAR 4	96.60	.03	8.24	5.11	2.03	47.40	41.9
APR 2	63.43	.71	7.97	4.95	1.97	45.87	42.8
MAY	83.71	2.78	8.24	5.11	2.05	47.45	48.2
JUN	5.27	9.23	7.97	4.95	2.04	46.21	66.0
JUL	.00	13.73	8.24	5.11	2.24	48.39	72.6
AUG	4.09	12.39	8.24	5.11	2.17	48.04	65.5
SEP :	90.99	7.05	7.97	4.95	2.03	46.17	67.1
OCT 2	58.84	1.07	8.24	5.11	2.04	47.41	44.6
NOV 3	98.44	.08	7.97	4.95	1.97	45.87	35.1
DEC 6	31.85	.00	8.24	5.11	2.03	47.40	26.9
YEAR 34	18.90	47.06	97.00	60.18	24.44	560.42	72.6

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 98917. BTU/(SQFT-YEAR)

BLDG 651 - BARRACKS WITH A/C - ECO-1 INSTALL 3.5" FIBERGLASS BATT INSUL.

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/	,	AVG.	MAX SYS	TEM	HOUR SYSTE	S WHEN M LOADS MET	MAXIMUM COOLING	MAXIMUM HEATING
	SQFT-	SOFT-	PF	DEG.	DEG.		COOL	HEAT	LOAD BTU	LOAD BTU
MONTH	DAY	DAY	FACTOR	F	+	_	COOL	IIDAI	BIU	B10
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	1177E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	1070E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2692E+06	1103E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.3180E+06	6380E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.4276E+06	4209E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.7370E+06	1752E+06
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.8846E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.7292E+06	1974E+06
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.8104E+06	3830E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.3963E+06	5727E+06
NOV	1039.	732.	1.000	47.	Ο.	Ο.	0	0	.2610E+06	7804E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	1255E+07

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BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
                                              1
 SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 ******REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995
               YEAR 1955
SITE LATITUDE DEG (AL1)
                             37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                            1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
FLOOR AREA (SQFT) 40986.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -891200.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
INFILTRATION PROFILE
 A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.00000
WINDOW GLASS NUMBER (NG) 30
                             47.000000
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
                                WALL DATA
                           1 2 3 4
.00 90.00 180.00 -90.00
8613.0 1828.0 8541.0 1826.0
435.0 18.5 467.0 17.2
WALL NUMBER
AZIMUTH ANGLE (AZ)
WALL AREA SQFT (AWLL)
WINDOW AREA SQFT (AWND)
WINDOW HEIGHT FT (WNDH)
WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 43.5 1.9 46.7 WIDTH OF OVERHANG (WOH) 2.5 2.5 2.5 OVERHANG HGT ABV WNDW (HOH) 1.0 1.0 1.0
                                10.0
                                          10.0 10.0
                                                               10.0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)				
WALL TRANSFER FUNCTIONS				
CN FACTORS	.00165		.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00018	.00018	.00018	.00018
N=3	.00084	.00084	.00018 .00084	.00084
N=2 N=3 N=4 N=5 N=6	.00056	.00056	.00056	.00056
N=5	.00006	.00006	.00006	.00006
N=6	*****	******	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4 N=5 N=6	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 13662	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 6.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.0784	09E-03		
ROOF B TRANSFER FUNCTIONS (BNR				
.000 .111E-03 .561E-03	.369E-03	.369E-04	738.	
ROOF D TRANSFER FUNCTIONS (DNR)			
1.00 -1.46 .533			999.	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.0				
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO				
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0	0	
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SE	SHSK (MST	,NDST)	1	1
			1	1
SKY LIGHT AREA SQFT (ASKY) (
DAYTIME SKY LIGHT U BTU/SQFT-HE	R-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT- FRACTION OF PROCESS HEAT TO IN:	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.300000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET

					POINT D	EG F
	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	HC	URLY FRACT	TION OF PE	AK		
1	.200	.000	1.000	1.000	72.0	76.0
2	.200	.000	1.000	1.000	72.0	76.0
3	.200	.000	1.000	1.000	72.0	76.0
4	.200	.000	1.000	1.000	72.0	76.0
5	.400	.000	1.000	1.000	72.0	76.0
6	.800	.000	1.000	1.000	72.0	76.0
7	1.000	.000	.800	.800	72.0	76.0
8	.200	.000	.400	.400	72.0	76.0

9							
	.200	.000	.100	.100	72.0		76.0
10	.200	.000	.100	.100	72.0		76.0
11	.200	.000	.100	.100	72.0		76.0
12	.200	.000	.100	.100	72.0		76.0
13	.200	.000	.100	.100	72.0		76.0
							76.0
14	.200	.000	.100	.100	72.0		
15	.200	.000	.100	.100	72.0		76.0
16	.400	.000	.300	.300	72.0		76.0
17	.800	.300	.800	.800	72.0		76.0
18	1.000	.300	.800	.800	72.0		76.0
19	1.000	.300	.500	.500	72.0		76.0
20	1.000	.300	.500	.500	72.0		76.0
21	1.000	.300	.800	.800	72.0		76.0
22	.800	.000	1.000	1.000	72.0		76.0
23			1.000	1.000	72.0		76.0
	.200	.000					
24	.200			1.000			76.0
	ING ABOVE AMB						
NO COOLI	NG BELOW AMB	IENT TEMP.	OF (TCLK	OT) (68.000000		
SYSTEM I	YPE, (IECN)	9)				
SUPPLY A	IR CFM (SACF	M) 27148	.000000				
ECONOMIZ	ER HIGH TEMP	LIMIT F	68.0	00000			
SYSTEM S	SUPPLY AIR ST	ART TIME H	IR 0.00	0000E+00			
	SUPPLY AIR ST			.000000			
	IXED AIR TEM			00000			
	SIDE AIR FRAC				00000-01		
	TDE AIR FRAC	TION OF SE					
	CIDICI (DDAN	\		, 1.00	0000E-01		
	CIENCY (EFAN	-	000E-01				
FAN TOTA	L PRESSURE I	N. WATER	000E-01				
FAN TOTA	L PRESSURE I	N. WATER	000E-01 (DP) 8	.00000E-0	01		
FAN TOTA VAV TYPE VAV MINI	L PRESSURE I (IVAV) MUM SUPPLY A	N. WATER 1 IR FRACTIO	000E-01 (DP) 8 ON (ARMIN)	.000000E-0	01 000E-01		
FAN TOTA VAV TYPE VAV MINI VAV COLD	AL PRESSURE I C (IVAV) MUM SUPPLY A D DECK TEMPER	N. WATER 1 IR FRACTIC ATURE F	000E-01 (DP) 8 ON (ARMIN)	.000000E-0	01 000E-01		
FAN TOTA VAV TYPE VAV MINI VAV COLD	L PRESSURE I (IVAV) MUM SUPPLY A	N. WATER 1 IR FRACTIC ATURE F	000E-01 (DP) 8 ON (ARMIN)	.000000E-0	01 000E-01		
FAN TOTA VAV TYPE VAV MINI VAV COLD	AL PRESSURE I C (IVAV) MUM SUPPLY A D DECK TEMPER	N. WATER 1 IR FRACTIC ATURE F	000E-01 (DP) 8 ON (ARMIN)	.000000E-0	01 000E-01	.400	.700
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA	N. WATER 1 IR FRACTIC ATURE F CTORS	0000E-01 (DP) 8 ON (ARMIN) (TCD)	.000000E-0	01 000E-01 000	.400	.700 .930
FAN TOTA VAV TYPE VAV MINI VAV COLD VAV FAN .000	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560	N. WATER 1 IR FRACTIC ATURE F CTORS .200	000E-01 (DP) 8 0N (ARMIN) (TCD)	2.5000 58.0000	000E-01 0000 .620		
FAN TOTA VAV TYPE VAV MINI VAV COLD VAV FAN .000 .500 .900	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00	0000E-01 (DP) 8 0N (ARMIN) (TCD) .560 .830 1.00	.000000E-0 2.5000 58.0000 .300 .700	000E-01 0000 .620 .880		
FAN TOTA VAV TYPE VAV MINI VAV COLD VAV FAN .000 .500 .900 HEATING	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU	0000E-01 (DP) 8 0N (ARMIN) (TCD) .560 .830 1.00 U (HFLOT)	.000000E-(2.500(58.000(.300 .700	000E-01 0000 .620 .880		
FAN TOTA VAV TYPE VAV MINI VAV COLD VAV FAN .000 .500 .900 HEATING HEATING	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU INPUT BTU	(DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 U (HFLOT) (HFLIN)	.000000E-(2.500(58.000(.300 .700 1700000.0(2125000.0(000E-01 0000 .620 .880		
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN .000 .500 .900 HEATING HEATING	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU INPUT BTU OAD VS FRA	(DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 U (HFLOT) (HFLIN) LC OF INPU	.000000E-(2.500(58.000(.300 .700 1700000.0(2125000.0(T TABLE (1	000E-01 0000 .620 .880 00000 00000 PLH)	.800	.930
FAN TOTA VAV TYPE VAV MINI VAV COLD VAV FAN .000 .500 .900 HEATING HEATING HEATING .100	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU INPUT BTU OAD VS FRA	(DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 J (HFLOT) (HFLIN) LC OF INPU	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1.300	000E-01 0000 .620 .880 00000 00000 PLH)	.400	.930
FAN TOTA VAV TYPE VAV MINI VAV COLD VAV FAN .000 .500 .900 HEATING HEATING HEATING .100 .500	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU INPUT BTU OAD VS FRA .200 .600	(DP) 8 (DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 (HFLOT) (HFLIN) AC OF INPU .286 .625	.000000E-(2.500(58.000(.300 .700 1700000.0(2125000.0(T TABLE (1	000E-01 0000 .620 .880 00000 00000 PLH)	.800	.930
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN .000 .500 .900 HEATING HEATING HEATING .100 .500 .900	L PRESSURE I (IVAV) MUM SUPPLY A D DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU INPUT BTU OAD VS FRA .200 .600 1.00	0000E-01 (DP) 8 0N (ARMIN) (TCD) .560 .830 1.00 J (HFLOT) (HFLIN) AC OF INPU .286 .625 1.00	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1.300	000E-01 0000 .620 .880 00000 00000 PLH)	.400	.930
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN .000 .500 .900 HEATING HEATING HEATING .100 .500 .900 CHILLER	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906 TYPE (ITYPCH	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU INPUT BTU OAD VS FRA .200 .600 1.00	(DP) 8 (DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 (HFLOT) (HFLIN) C OF INPU .286 .625 1.00 0	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1	000E-01 0000 .620 .880 00000 00000 PLH) .369 .718	.400	.930
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN .000 .500 .900 HEATING HEATING HEATING .100 .500 .900 CHILLER	L PRESSURE I (IVAV) MUM SUPPLY A D DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU INPUT BTU OAD VS FRA .200 .600 1.00	(DP) 8 (DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 (HFLOT) (HFLIN) C OF INPU .286 .625 1.00 0	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1	000E-01 0000 .620 .880 00000 00000 PLH) .369 .718	.400	.930
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN .000 .500 .900 HEATING HEATING HEATING .100 .500 .900 CHILLER COOLING	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906 TYPE (ITYPCH	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU OAD VS FRA .200 .600 1.00) OUTPUT BTU	(DP) 8 (DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 J (HFLOT) (HFLIN) AC OF INPU .286 .625 1.00 0	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1 .300 .700	000E-01 0000 .620 .880 00000 00000 PLH) .369 .718	.400	.930
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN .000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING	L PRESSURE I (IVAV) MUM SUPPLY A D DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906 TYPE (ITYPCH PLANT RATED	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU OAD VS FRA .200 .600 1.00) OUTPUT BTU INPUT BTU	(DP) 8 (DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 J (HFLOT) (HFLIN) AC OF INPU .286 .625 1.00 0 J (CFLOT) (CFLIN)	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1 .300 .700	01 000E-01 000 .620 .880 00000 00000 PLH) .369 .718	.400	.930
FAN TOTA VAV TYPE VAV MINI VAV COLE VAV FAN .000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING	L PRESSURE I (IVAV) MUM SUPPLY A D DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906 TYPE (ITYPCH PLANT RATED	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU OAD VS FRA .200 .600 1.00) OUTPUT BTU INPUT BTU	(DP) 8 (DP) 8 (N (ARMIN) (TCD) .560 .830 1.00 J (HFLOT) (HFLIN) AC OF INPU .286 .625 1.00 0 J (CFLOT) (CFLIN)	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1 .300 .700	01 000E-01 000 .620 .880 00000 00000 PLH) .369 .718	.400	.930
FAN TOTAL VAV TYPE VAV MINI VAV COLD VAV FAN .000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING COOLING COOLING .100	L PRESSURE I (IVAV) MUM SUPPLY A DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906 TYPE (ITYPCH PLANT RATED PLANT RATED PLANT RATED PLANT RATED PLANT RATED PLANT RATED PLANT RATED PLANT RATED PLANT RATED PLANT PART L .200	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU OAD VS FRA .200 .600 1.00) OUTPUT BTU OUTPUT BTU INPUT BTU OAD FRAC V .200	0000E-01 (DP) 8 0N (ARMIN) (TCD) .560 .830 1.00 J (HFLOT) (HFLIN) .C OF INPU .286 .625 1.00 0 J (CFLOT) (CFLIN) S FRAC RA	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1) .300 .700 892000.00 164905.00 TED COP (1)	000E-01 0000 .620 .880 00000 00000 PLH) .369 .718	.400	.930 .451 .812
FAN TOTAL VAV TYPE VAV MINI VAV COLD VAV FAN .000 .500 .900 HEATING HEATING .100 .500 .900 CHILLER COOLING COOLING	L PRESSURE I (IVAV) MUM SUPPLY A D DECK TEMPER PART LOAD FA .560 .770 .980 PLANT RATED PLANT RATED PLANT PART L .191 .537 .906 TYPE (ITYPCH PLANT RATED PLANT RATED PLANT RATED	N. WATER 1 IR FRACTIC ATURE F CTORS .200 .600 1.00 OUTPUT BTU OAD VS FRA .200 .600 1.00) OUTPUT BTU OUTPUT BTU	0000E-01 (DP) 8 0N (ARMIN) (TCD) .560 .830 1.00 J (HFLOT) (HFLIN) AC OF INPU .286 .625 1.00 0 J (CFLOT) (CFLIN)	.000000E-0 2.5000 58.0000 .300 .700 1700000.00 2125000.00 T TABLE (1) .300 .700 892000.00 164905.00 TED COP (1)	01 000E-01 0000 .620 .880 00000 00000 PLH) .369 .718 000000 00000	.400	.451 .812

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTIT	N				
			SOLAR		DOOR				VENT	
			THRU		AND				AND	
	H LOAD					BSMT	WALL	WINDOW	INFL	LATENT
JAN	0.			0.		0.			0.	0.
	-432.	LOSS		-27.	-1.	0.	-25.	-14.	-441.	0.
FEB	0.	GAIN	16.	Ο.	0.	0.	0.	0.	0.	0.
	-362.	LOSS		-24.	-1.	0.	-19.	-12.	-378.	0.
MAR	1.	GAIN	21.	0.	0.	0.	0. -15.	0.	0.	Ο.
	-310.	LOSS		-20.	-1.	0.	-15.	-11.	-346.	0.
APR	12.	GAIN	20.	0.	0.	0.	2.	0.	2.	5.
	-144.	LOSS		-12.	-1.	0.	2. -7.	-6.	-201.	0.
MAY	48.	GAIN	23.	0.	0.	0.	4.	0.	4.	22.
	-33.	LOSS		-5.	0.	0.	-1.	-4.	-108.	0.
JUN	181.	GAIN	23.	1.	0.	0.	8.	1.	12.	111.
	-1.	LOSS		-1.	0.	0.	Ο.	-2.	-47.	0.
JUL			23.	3.	0.	0.	11.	2.	33.	156.
	0.	LOSS		0.	0.	0.	0.	-1.	-27.	0.
AUG			20.		0.			1.	23. -30.	148.
	-1.	LOSS		0.	0.	0.	0.	-1.	-30.	0.
SEP	139.		17.	0.	0.	0.	5.	1.		
	-39.	LOSS		-4.	0.	0.	-2.	-3.	-86.	0.
OCT	19.		16.		0.					
	-132.	LOSS		-12.	-1.		-7.	-6.	-185.	0.
NOV			13.	0.			0.	0.	0.	1.
	-232.			-18.	-1.	0.	0. -14.	-9.	-272.	0.
DEC	0.	GAIN	12.	0.			0.			0.
	-422.	LOSS		-28.	-1.	0.	-25.	-14.	-425.	0.
TOT	914.				0.					
	-2109.	LOSS		-153.	-8.	0.	-115.	-83.	-2545.	0.
MAX	HEATING	LOAD=	-1247	297. E	TUH ON I	DEC 18	HOUR 2	AM B	IENT TEM	P 3.
MAX	COOLING	LOAD=	881	233. E	BTUH ON J	TUL 14	HOUR 17	AMB:	IENT TEM	P 92.

ZONE UA BTU/HR-F 2598.4

BEACON Energy Analysis By EMC Engineers, Inc. 651RGD.I

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

FAN TOTAL INTERNAL INTERNAL SPACE COIN-LIGHTING PROCESS HEAT HEAT GAIN TEMPERATURE F CIDENT THOUSAND MILLION MILLION MILLION MONTH AVG. MAX MIN DAY HR AMBT. KWH BTU BTU BTU 8.24 5.11 2.94 47.40 JAN 72. 73. 14 64. 72. 24 33. 31 24 66. 7.44 4.62 2.65 42.81 FEB 72. 74. 72. 28 24 34. MAR 72. 76. 24 22 68. 8.24 5.11 2.94 47.40 72. 31 24 32. 2.85 45.87 APR 73. 77. 27 16 74. 7.97 4.95 72. 7 60. 30 3 67. 8.24 MAY. 31 5.11 3.00 47.45 74. 77. 72. 6 60. 28 JUN 76. 77. 6 1 67. 7.97 4.95 3.21 46.23 6 59. 72. 19 24 72. 8.24 JUL 76. 77. 13 5.11 3.89 48.35 73. 5 57. 10 AUG 76. 78. 24 5 67. 8.24 5.11 3.55 48.01 72. 26 7 60. 13 9 72. 7.97 4.95 3.16 46.18 SEP 75. 77. 72. 24 51. 30 OCT 73. 77. 6 15 71. 8.24 5.11 2.95 47.41 72. 31 24 44. 4.95 9 68. 7.97 2.84 45.87 NOV 72. 77. 8 15 68. 72. 21 72. 72. 23 14 70. 8.24 5.11 2.94 47.40 72. 31 24 42.

97.00

60.18

36.91

560.39

YEAR

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF 1	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING CO	OOLING	HEATING	COOLING
JAN	735	744	0	0	1171E+07	.0000
FEB	660	672	0	0	1065E+07	.0000
MAR	676	744	0	0	1097E+07	.2922E+06
APR	441	720	0	0	6347E+06	.3181E+06
MAY	183	744	0	0	4201E+06	.4445E+06
JUN	13	720	0	0	1762E+06	.7336E+06
JUL	0	744	0	0	.0000	.8812E+06
AUG	10	744	0	0	1991E+06	.7256E+06
SEP	191	720	0	0	3822E+06	.8073E+06
OCT	478	744	0	0	5699E+06	.3932E+06
NOV	618	720	1	0	7750E+06	.2615E+06
DEC	741	744	0	0	1247E+07	.0000
YEAR	4746	8760	1	0	1247E+07	.8812E+06

SYSTEM TOTALS

MONTE	HEATING MILLION H BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	TION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
			Kill	<i>B</i> 10	KWH	ВІО	KW
JAN	635.68	.00	8.24	5.11	2.03	47.40	26.9
FEB	542.07	.00	7.44	4.62	1.84	42.81	26.9
MAR	494.26	.05	8.24	5.11	2.03	47.40	42.2
APR	262.14	.71	7.97	4.95	1.97	45.87	42.8
MAY	83.28	2.73	8.24	5.11	2.05	47.45	49.0
JUN	5.27	9.19	7.97	4.95	2.04	46.23	65.8
JUL	.00	13.61	8.24	5.11	2.23	48.35	72.4
AUG	4.10	12.32	8.24	5.11	2.16	48.01	65.2
SEP	90.94	6.98	7.97	4.95	2.03	46.18	66.9
OCT	257.91	1.07	8.24	5.11	2.04	47.41	44.6
NOV	396.39	.08	7.97	4.95	1.97	45.87	35.2
DEC	627.48	.00	8.24	5.11	2.03	47.40	26.9
YEAR	3399.52	46.74	97.00	60.18	24.43	560.39	72.4

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 98416. BTU/(SQFT-YEAR)

BLDG 651 - BARRACKS WITH A/C - ECO-2 INSTALL 1.5" RIGID INSULATION

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/		AVG.	MAX SYS		SYSTE	S WHEN M LOADS MET	MAXIMUM COOLING LOAD	MAXIMUM HEATING LOAD
	SOFT-	SOFT-	PF	DEG.	DEG.		COOL	HEAT	BTU	BTU
MONTH	_	DAY	FACTOR	F	+	_	COOL	******	210	210
				_	•					
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1171E+07
									-	
FEB	1464.	929.	1.000	37.	0.	Ο.	0	0	.0000	1065E+07
MAD	1000	1054	1 000	4.5	•		•	•		
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.2922E+06	1097E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.3181E+06	6347E+06
					• •	•	ŭ	ŭ	.51012.00	.031/2/00
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.4445E+06	4201E+06
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.7336E+06	1762E+06
JUL	2546.	2015.	1.000	77.	Ο.	0.	0	0	.8812E+06	.0000
OOL	2546.	2015.	1.000	//.	υ.	Ο.	U	U	.8812E+06	.0000
AUG	2280.	1840.	1.000	76.	Ο.	0.	0	0	.7256E+06	1991E+06
										•
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.8073E+06	3822E+06
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	20225.00	EC00E: 05
001	1437.	233.	1.000	57.	0.	0.	U	U	.3932E+06	5699E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.2615E+06	7750E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	1247E+07

Location: Fort Leonard Wood, Missouri

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORM	ATION:						
Building No:	651	Building Name:	Barracks				
Surveyed by: [OMS	Date:	11/9/95		Building Use:	Living Quarters	
Building Contact:					Phone No:		
Building Contact:					Phone No:		
OCCUPANCY:							
Number of Occupants	s: Mon./Fri.:	125		Schedule:	0	То	2400
	Tues./Thurs	125			0	То	2400
	Wed.	125			. 0	To	2400
	Sat./Sun.	125			0	То	2400
Visitors Per Day:	Mon./Fri.:			Schedule:	, <u>, , , , , , , , , , , , , , , , , , </u>	То	
	Tues./Thurs					То	
	Wed.					То	1111111111111
	Sat./Sun.				1000	То	
Comments:							
LIGHTING SCHEDUL	_E:						
Normal Occupancy:	MonFri.:			Schedule:	500	То	2200
	Sat./Sun.:				500	То	2200
Cleaning Crew/2nd Sh				Schedule:		То	
	Sat./Sun.:					То	
EQUIPMENT SCHED	ULE:						
Fan/AHU Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:	-			0	То	2400
Chiller Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Boiler Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Aux. Equipment Sched	dule:	***					
programme addition	MonFri.:	19 × 16- ×		Schedule:		То	
	Sat./Sun.:					То	
	MonFri.:			Schedule:		То	
	Sat./Sun.:					То	
Comments:			-				

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building Name: Barracks

E M C No. 1406-011

Prepared by: DMS

Date: 2/18/96

Building No 651

BUILDING ENVELOPE

		EXTERIOR WALLS		IST OF EXT. WALL CONSTRUCTION TYPES
Wall	Wall			
Direction (N	, Construction		Wall Construction	1
E, W, or S)	No.	Comments	No.	Description
N	XW-1		XW-I	Face Brick & CMU
E	XW-1		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-1		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-1		XW-4	Face Brick, CMU, & Plaster Coat
			XW-5	Insulated Metal Panel
			,	insulated fretal failer
Window	Window	WINDOWS		LIST OF WINDOW TYPES
Direction (N,			Window	
E, W, or S)	No.	Comments	Window Construction No.	Description
N	W-1		W-I	Description Double Pane Clear
E	W-1		W-2	Double Pane Tinted
S	W-1		W-3	
W	W-1			Single Pane with Storm Windows
		GENERAL: Top third of window frame is an	W-4	Single Pane
		insulated metal panel.		
		modiated metal pariel.		
		OOF CONSTRUCTION		
	Roof	SOL CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
Roof	Construction		Roof Construction	
Location	No.	Comments	No.	Description
ALL	R-7		R-I	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
			R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceili Tile
			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
			R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plast Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceilin Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plast Clg.
			R-7	BUR, Rigid Insul., 7-1/2" Concrete Slab

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 651 Building Name: Barracks

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

1	INT	ERIOR EQUIP	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall					
Direction (N,					
E, W, or S)	Item No.	No. of Items	Comments	ltem No.	Description
					Architectural
				A-I	Interior Partitions
N	M-3	45		A-2	Wall Placards
N	E-3	9		A-3	Drapery Valances
N	E-2	6		A-4	Drapery Rods
N	A-5	6		A-5	Stainless Steel Shelf in Latrine
N	A-6	6	Glazed structural block 5'-0" A.F.F. in latrine	A-6	Dryer Vents
N	E-1	3			
					Plumbing
E	M-3	6		P-I	Sinks
				P-2	Commodes
S	E-3	6	Glazed structural block 9'-0" A.F.F. in laundry	P-3	Toilet Stalls
S	M-3	45		P-4	Water Fountains
S	P-5	3		P-5	Slop Sink
W	E-2	6			HVAC Mechanical
W	M-3	3		M-I	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
,				M-4	Thermostats / Space Temp. Sensors
				M-5	Wall mounted convection type heater
			W. B		
					Electrical
				E -1	Electrical Panels
				E-2	Electrical Outlets
				£-3	Electrical Light Switches
				E-4	Electrican Conduit
				E-5	Emergency light
				E-6	Electrical Disconnect
					Electrical produces
					Lighting
				L-I	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
					Fire Protection
				F-I	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
					Communication
				C-I	Telephones - Wall Mounted
				C-2	Telephones - Booth Mounted
				C-3	Telephone Jacks

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96 **DMS**

CHECKED BY:

AJN

BLDG:

651

FILE:

	AIR HANDLING UNIT SURV	EY OBSERVATIONS	
VAV-1	AHU NO.	MER	LOCATION (RM)
C.PLANT	REF. SYS. SERVING AHU	SOUTH	SERVES AREA

	UNIT TYPE:										
SINGLE ZN	2-PIPE FC		4-PIPE FC		UNIT HTR		H&V				
MULTIZONE	DOUBLE DT		REHEAT		INDUCTION	X	VAV				
NUMBER OF ZONES		45	OTHER	VAV BOXE	S						
COMMENT:											

					NAMEPL	AIC:				
					MFG.					MOD
15.0	SUPPLY FAN HP		MARATHON		MFG.	DD	254TTDR7343C	cw		MOD
3.0	RET/EXH FAN HP		RELIANCE		MFG.		P18K13AMZ			MOD
13574	CFM-HTG 1:	547	CFM-CLG	10%	MIN %OA	100%	MAX %OA	0.0%	% HTG	AREA SERVE

				COILS:			
х	NONE	STM		нw	ELEC	MOD VLV	PREHEAT
х	NONE	STM		нw	ELEC	MOD VLV	HEATING
x	NONE	STM		нw	ELEC	MOD VLV	REHEAT
×	NONE	STM		нw	EVAP MEDIA	MOD VLV	HUMID.
	NONE	DX	х	cw		MOD VLV	COOLING

				(PERAT	ON:					
HOURS	ON:		s	м	Т	w	т	F	S	COMMENTS	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES	
REQUIRED	START TIME									NO PINS IN TO	
REQUIRED	STOP TIME								•		
MONTH	S ON:										
J	F	М	Α	М	J	J	Α	s	0	N	D
				1	1	1	1	1			

				CONTRO	LS:				
	х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	×	SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Y	MAX OA (Y/N)	Y	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES		NO					
COMMENTS:	MANUA	OA DAMPER POS	SITION,	LINKAGE GOOD					

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96 DMS

PREPARED BY: CHECKED BY:

AJN

	BLDG:	651	FILE:						
	AIR HANDLING UNIT SURVEY OBSERVATIONS								
VAV-2	AHU NO.		MER	LOCATION (RM)					
C.PLANT	REF. SYS. SERVING AHU		NORTH	SERVES AREA					

		UNIT T	YPE:			
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR		H&∨	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION	х	VAV	
NUMBER OF ZONES	45	OTHER	AV BOXES			
COMMENT:				***************************************		

					MFG.					MODEL
15.0	SUPPLY FAN H	I P	MARATHON		MFG.	DD	254TTDR7343C	cw		MODEL
3.0	RET/EXH FAN	HP	RELIANCE		MFG.		P18K13AMZ			MODEL
13574	CFM-HTG	13547	CFM-CLG	10%	MIN %OA	100%	MAX %OA	0.0%	% HTG AREA	SERVED

				COILS:			
х	NONE	STM		нw	ELEC	MOD VLV	PREHEAT
×	NONE	sтм		HW	ELEC	MOD VLV	HEATING
x	NONE	STM		нw	ELEC	MOD VLV	REHEAT
х	NONE	STM		нw	EVAP MEDIA	MOD VLV	HUMID.
	NONE	DX	х	cw		MOD VLV	COOLING

				(OPERATI	ON:					
HOURS OF	۷:		S	М	т	w	т	F	S	COMMENTS	
PRESENT STA	ART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT ST	OP TIME		2400	2400	2400	2400	2400	2400	2400	YES	
REQUIRED ST	TART TIME									NO PINS IN TC	
REQUIRED ST	OP TIME										
MONTHS (ON:							•			
j	F	М	Α	М	J	J	Α	s	0	N	D
				1	1	1	1	1	***************************************		

				CONTRO	LS:				
	х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:	x	SINGLE STPT		DUAL SETPNT		SETBACK			
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Y	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:		YES		NO					
COMMENTS:	MANUAL	OA DAMPER POS	ITION, I	INKAGE GOOD					

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

651

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS

CHECKED BY: AJN

FILE:

	PERIMETER RADIATION SURVEY OBSERVATIONS										
RAD-1	PER RAD NO.	NORTH	LOCATION (RM)								
CONV-1	SOURCE OF HEATING	NORTH	SERVES AREA								

UNIT TYPE:									
STEAM	х	HW	ELECTRIC						
OTHER									
COMMENT:									

NAMEPLATE:									
HW PUMP 1 - HP	MFG.	MODEL							
HW PUMP 2 - HP	MFG.	MODEL							
HW PUMP 3 - HP	MFG.	MODEL							
HW PUMP 4 - HP	MFG.	MODEL							
COMMENT: SEE CONVERTER		40.0% % AREA HEATING							

					OPERAT	ION:					
HOURS	ON:		s	М	Т	w	т	F	s	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	S ON:								,		
J	F	М	Α	М	J	J	Α	s	0	N	D
1	1	1	1						1	1	1

		CONTROLS	S:		
	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
RADIATION CONTROL:	NONE	2-WAY VLV	3-WAY VLV	OTHER	NO CONTROL
SPACE SETPOINT (°F):	OCC HEAT	UNOCC HEAT	OCC COOL	UNOCC COO	DL
RESET CONTROL (°F):	HW HIGH	HW LOW	OA LOW	OA HIGH	
COMMENTS:			-		

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS AJN

CHECKED BY:

	BLDG:	651	FILE:		
	PERIMETER RADIATION	ON SURVEY O	BSERVATION	IS	
RAD-2	PER RAD NO.	NORTH	****	LOCATION	(RM)
CONV-2	SOURCE OF HEATING		NORTH	SERVES AF	REA

			UNIT TYPE:			
STEAM	x	HW	ELECTRIC			-
OTHER				 	 	
COMMENT:				 		

	NAMEPLATE:		
HW PUMP 1 - HP	MFG.		MODEL
HW PUMP 2 - HP	MFG.		MODEL
HW PUMP 3 - HP	MFG.	·	MODEL
HW PUMP 4 - HP	MFG.		MODEL
OMMENT: SEE CONVERTER		40.0% % AREA	HEATING

				C	PERATI	ON:					
HOURS C	N:		s	М	т	w	т	F	s	COMMENT	*
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400	· · · · · · · · · · · · · · · · · · ·	
REQUIRED S	START TIME										
REQUIRED S	STOP TIME										
MONTHS	ON:				·L.					***	
J	F	М	Α	М	J	J	A	s	0	N	D
1	1	1	1							1	

		CONTROLS	S:		
	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
RADIATION CONTROL:	NONE	2-WAY VLV	3-WAY VLV	OTHER	NO CONTROL
SPACE SETPOINT (°F):	OCC HEAT	UNOCC HEAT	OCC COOL	UNOCC COOL	
RESET CONTROL (°F):	HW HIGH	HW LOW	OA LOW	OA HIGH	

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS AJN

CHECKED BY:

651 FILE:

	BLDG:	651	FILE:	
	PERIMETER RADIATION	N SURVEY	OBSERVATION	S
RAD-3	PER RAD NO.		OTHER	LOCATION (RM)
CONV-3	SOURCE OF HEATING		OTHER	SERVES AREA

			UNIT TYPE:		
STEAM	х	нw	ELECTRIC		
OTHER					
COMMENT:					

	NAMEPLATE:			
HW PUMP 1 - HP	MFG.		MODEL	
HW PUMP 2 - HP	MFG.		MODEL	
HW PUMP 3 - HP	MFG.		MODEL	
HW PUMP 4 - HP	MFG.		MODEL	
OMMENT: SEE CONVERTER	•	20.0% % AREA HEA	20.0% % AREA HEATING	

				OPERAT	ION:					
HOURS ON:		S	М	Т	w	Т	F	s	COMMENT	·
PRESENT START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED START TIME		,								
REQUIRED STOP TIME										
MONTHS ON:										
J F	М	Α	М	J	J	Α	s	0	N	D
1 1	1	1						1	1	1

		CONTROLS	S:		
	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
RADIATION CONTROL:	NONE	2-WAY VLV	3-WAY VLV	OTHER	NO CONTROL
SPACE SETPOINT (°F):	OCC HEAT	UNOCC HEAT	OCC COOL	UNOCC COOL	
RESET CONTROL (°F):	HW HIGH	HW LOW	OA LOW	OA HIGH	
COMMENTS:					

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS AJN

CHECKED BY:

FILE:

	BLDG:	651	FIL	.E:
	BOILER & CONVERTER	SURVEY OF	SERVATIO	VS
CV-1	BOILER/CONVERTER NO.		MER	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)		ALL	SERVES AREA

			UNIT TYPE		
	STEAM	PSIG	HW	TEMP.	BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:
х	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:
х	SPACE HEAT	DHW	OTHER		USE:
OMME	NT:			0% 9	6 HTG AREA SERVED
				В	B RADIATION ONLY

				NAMEPLATE:			
DUNHAM-	BUSH	MFG.	SCA-82	MODEL	936000	CAPACITY OUTPUT (BT)	JH)
					936000	CAPACITY INPUT (BTUH)
		MFG.		MODEL		CAPACITY OUTPUT (BT)	JH)
						CAPACITY INPUT (BTUH)
0.75	HW PUMP	1 - HP	GE	MFG.	5K38MG567		MODEL
	HW PUMP	2 - HP		MFG.			MODEL
	HW PUMP	3 - HP		MFG.			MODEL

				C	PERATI	ON:					· · · · · · · · · · · · · · · · · · ·
HOURS	ON:		s	м	т	w	т	F	s	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	·····
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES - NO PINS	
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTH	S ON:									L	
י	F	М	Α	м	J	J	Α	s	0	N	D
1	1	1	1						1	1	1

	Х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	160	HW HIGH	80	HW LOW	65	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	CONTROL	S IN GOOD CONDI	TION						

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

FILE:

Feb-96

PREPARED BY:

DMS AJN

CHECKED BY:

BLDG: **651**

	BOILER & CONVERTER SU	RVEY OBSERVATIO	NS
CV-2	BOILER/CONVERTER NO.	MER	LOCATION (RM)
C. PLAN	T SOURCE OF HEATING (PLANT)	ALL	SERVES AREA

			UNIT TYPE		
	STEAM	PSIG	HW	TEMP.	BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:
х	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:
х	SPACE HEAT	DHW	OTHER		USE:
СОММЕ	NT:			0%	% HTG AREA SERVED
					BB RADIATION ONLY

				NAMEPLATE:			
UNHAM-B	USH	MFG.	SCA-82	MODEL	933000	CAPACITY OUTPUT (B)	ГИН)
			• • • • • • • • • • • • • • • • • • • •		933000	CAPACITY INPUT (BTU	H)
		MFG.		MODEL		CAPACITY OUTPUT (B)	гин)
						CAPACITY INPUT (BTU	H)
0.75	HW PUMP 1	- HP	GE	MFG.	5K43GG3265		MODEL
	HW PUMP 2	- HP		MFG.		•	MODEL
1	HW PUMP 3	- HP		. MFG.			MODEL

					OPERAT	ION:					
HOURS	ON:		S	М	Т	w	T	F	s	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES - NO PINS	
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	S ON:								•		
j	F	М	Α	М	J	j	Α	S	0	N	D
1	1	1	1						1	1	

	X	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	160	HW HIGH	80	HW LOW	65	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	CONTROL	S IN GOOD CONDI	TION						

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96 DMS

PREPARED BY: CHECKED BY:

AJN

FILE:

	BOILER & CONVERTER SUR	VEY OBSERVATIO	NS
CV-3	BOILER/CONVERTER NO.	MER	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	ALL	SERVES AREA

651

BLDG:

			UNIT TYPE	:	
	STEAM	PSIG	HW	ТЕМР.	BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:
x	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:
x	SPACE HEAT	DHW	OTHER		USE:
ОММЕ	NT:			0% %	HTG AREA SERVED
			-	BI	B RADIATION ONLY

				NAMEPLATE:			
DUNHAM-B	USH	MFG.	SCA-42	MODEL	936000	CAPACITY OUTPUT (BT	JH)
					936000	CAPACITY INPUT (BTUH	}
		MFG.		MODEL		CAPACITY OUTPUT (BT	JH)
						CAPACITY INPUT (BTUH)
0.75	HW PUMP 1 - I	HP	GE	MFG.			MODEL
	HW PUMP 2 - I	НР		MFG.			MODEL
	HW PUMP 3 -1	HP		MFG.	· · · · · · · · · · · · · · · · · · ·		MODEL

					OPERATI	ON:					
HOURS	ON:		s	M	т	w	Т	F	S	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK	,
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	YES - NO PIN	is
REQUIRED	START TIME										
REQUIRED	STOP TIME										W
MONTH	ON:		·	•					***************************************	***************************************	
J	F	М	Α	М	J	J	Α	s	0	N	D
1	1	1	1				,		1	1	1

	Х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	160	HW HIGH	80	HW LOW	65	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:	CONTROL	S IN GOOD COND!	TION						

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

PREPARED BY:

DATE:

Feb-96 **DMS**

CHECKED BY:

AJN

FILE:

REFRIGERATION EQUIPMENT SURVEY OBSERVATIONS									
CWP-1	CHILLER/COMPRESSOR NO.	MER	LOCATION (RM)						

651

BLDG:

			UNIT T	YPE:		
	CENTRIFUGAL WI	TH WATER SIDE COOL	ING TOWER	х	OTHER	CHW PUMP
	RECIPROCATING V	WITH WATER SIDE CO	DLING TOWER		AHU'S SEF	RVED
	RECIPROCATING \	WITH AIR COOLED COM	DENSING UNIT			
	ABSORBTION WIT	H WATER SIDE COOLI	NG TOWER			
	AIR COOLED CON	DENSING UNIT				
x	CHW	DX	OTHER			

					NAM	EPLATE:				
CHILLER		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		CAPACITY	(TONS)
TOWER		MFG.				MODEL				# OF FANS
	VOLTS		AMPS		PH		HZ		HP each	
CW PUMP	MARATHON	MFG.	KVA145TTDR	7644AEW		MODEL				SERIAL NO.
208	VOLTS	6.3	AMPS	3	PH	60	HZ	2	НР	
CNW PUM	Р	MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		HP	
COMMENT	S:	•								

				С	PERATI	ON:					
HOURS (ON:		s	м	т	w	Т	F	S	COMMENT	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	S ON:				·						
J	F	М	Α	М	J	J	Α	s	0	N	D
				1	1	1	1	1			

SETPOINTS PANEL INDICATORS	CWS (oF)	CWR (oF)	CNWS (oF)	CNWR (oF)	NONE
PANEL INDICATORS					HOIL
	l				
- PRESSURE	LITE-HI	LITE-LOW	GAUGES		
- TEMPERATURE	LITE-HI	LITE-LOW	GAUGES		
- OTHER					

ANNUAL ENERGY SAVINGS SUMMARY FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747, 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

1	ĺ			Baseline		Peak	Baseline		Annual
	Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
							Energy		
Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
730	0.00	0.00	0.00	24.20	24.20	0.00	3074.08	2812.35	261.73

					A 31 1		4 1: . 1		
İ					Adjusted		Adjusted	1	Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 730	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
731	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
736	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
737	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
738	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
747	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
748	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
<i>7</i> 55	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
<i>7</i> 56	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
<i>7</i> 57	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
815	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
816	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
817	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
818	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
819	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
827	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
828	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
829	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
830	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73
831	40,640	40,640	1.000	0.00	0.00	0.00	0.00	261.73	261.73

^{*}Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747, 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

1				Baseline					Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
ł	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
730	0.00	0.00	0.00	24.20	24.20	0.00	3074.08	2795.18	278.90

							l	I .	l
			_		Adjusted	:1	Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 730	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
731	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
736	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
737	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
738	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
747	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
748	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
7 55	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
756	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
7 57	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
815	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
816	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
817	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
818	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
819	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
827	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
828	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
829	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
830	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90
831	40,640	40,640	1.000	0.00	0.00	0.00	0.00	278.90	278.90

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
730	\$178,577

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 730	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)*	Cost (\$)*
731	40,640	40,640	1.000	\$178,577	\$178,577
736	40,640	40,640	1.000	\$178,577	\$178,577
737	40,640	40,640	1.000	\$178,577	\$178,577
738	40,640	40,640	1.000	\$178,577	\$178,577
747	40,640	40,640	1.000	\$178,577	\$178,577
748	40,640	40,640	1.000	\$178,577	\$178,577
<i>7</i> 55	40,640	40,640	1.000	\$178,577	\$178,577
756	40,640	40,640	1.000	\$178,577	\$178,577
<i>7</i> 5 <i>7</i>	40,640	40,640	1.000	\$178,577	\$178,577
815	40,640	40,640	1.000	\$178,577	\$178,577
816	40,640	40,640	1.000	\$178,577	\$178,577
817	40,640	40,640	1.000	\$178,577	\$178,577
818	40,640	40,640	1.000	\$178,577	\$178,577
819	40,640	40,640	1.000	\$178,577	\$178,577
827	40,640	40,640	1.000	\$178,577	\$178,577
828	40,640	40,640	1.000	\$178,577	\$178,577
829	40,640	40,640	1.000	\$178,577	\$178,577
830	40,640	40,640	1.000	\$178,577	\$178,577
831	40,640	40,640	1.000	\$178,577	\$178,577

^{*}Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY FOR BARRACKS WITHOUT A/C - BUILDINGS 730, 731, 736, 737, 738, 747 748, 755, 756, 757, 815, 816, 817, 818, 819, 827, 828, 829, 830, & 831

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
730	\$183,884

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 730	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
731	40,640	40,640	1.000	\$183,884	\$183,884
736	40,640	40,640	1.000	\$183,884	\$183,884
737	40,640	40,640	1.000	\$183,884	\$183,884
738	40,640	40,640	1.000	\$183,884	\$183,884
747	40,640	40,640	1.000	\$183,884	\$183,884
748	40,640	40,640	1.000	\$183,884	\$183,884
<i>7</i> 55	40,640	40,640	1.000	\$183,884	\$183,884
<i>7</i> 56	40,640	40,640	1.000	\$183,884	\$183,884
<i>7</i> 57	40,640	40,640	1.000	\$183,884	\$183,884
815	40,640	40,640	1.000	\$183,884	\$183,884
816	40,640	40,640	1.000	\$183,884	\$183,884
817	40,640	40,640	1.000	\$183,884	\$183,884
818	40,640	40,640	1.000	\$183,884	\$183,884
819	40,640	40,640	1.000	\$183,884	\$183,884
827	40,640	40,640	1.000	\$183,884	\$183,884
828	40,640	40,640	1.000	\$183,884	\$183,884
829	40,640	40,640	1.000	\$183,884	\$183,884
830	40,640	40,640	1.000	\$183,884	\$183,884
831	40,640	40,640	1.000	\$183,884	\$183,884

^{*}Investment Cost prorated on a square foot basis

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) PROJECT NO: 1406-011 REGION: 2 (Missouri) LOCATION: Fort Leonard Wood FISCAL YEAR: 1996 Limited Energy Study, Insulate Brick Buildings PROJECT TITLE: PREPARED BY: D. Sinz ANALYSIS DATE: 02/18/96 **ECONOMIC LIFE:** 20 **BLDG 730 - INSTALL 3.5" BATT INSULATION ON WALLS** 1. INVESTMENT: \$158,033 A. CONSTRUCTION COST \$11,062 B. SIOH COST (7.0% of 1A) =\$9,482 **DESIGN COST** (6.0% of 1A) =\$178,577 D. TOTAL COST (1A + 1B + 1C) =E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 F. PUBLIC UTILITY COMPANY REBATE = \$0 ----> \$178,577 G. TOTAL INVESTMENT (1D - 1E - 1F) =2. ENERGY SAVINGS (+) OR COST (-): JAN '96 DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: DISCOUNT DISCOUNTED **FUEL COS SAVINGS** ANNUAL \$ SOURCE \$/MBTU (1) MBTU/YR (2) SAVINGS (3) FACTOR (4) SAVINGS (5) 0.00 13.80 \$0 A. ELECT. \$7.33 \$0 B. DIST \$0.00 0 \$0 0.00 \$0 17.76 \$24,636 \$5.30 261.73 \$1,387 C. NAT GAS \$0.00 \$0 0.00 \$0 D. COAL 0 \$0 \$0 13.47 E. ELEC. DEMAND ----> \$24,636 261.73 \$1,387 TOTAL 3. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) \$0 1 ANNUAL MAINTENANCE \$0 14.88 ŝΩ \$0 14.88 2 14.88 ŝO 3 \$0 ŝΩ 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST ĠΩ B. NON-RECURRING (+/-) DISCOUNT DISCOUNTED **ITEM** SAVINGS (+) YEAR OF COST(-) (1) OCCURRENCE (2) FACTOR (3) SAVINGS/COST (4) (TABLE A-2) a. BASELINE EQUIP. REPLCMNT. \$0 \$0 \$0 b. \$0 c. ŝΩ đ. \$0 f. TOTAL \$0 ŝΩ C. TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) =\$0 (2F3+3A4+(3Bf1/Economic Life)) \$1,387 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) 5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) (1G/4) =128.73 6. TOTAL NET DISCOUNTED SAVINGS (2F5 + 3C) =\$24,636 0.14 7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR) (6/1G) =

LIFE CYCLE COST ANALYSIS SUMMARY

(MUST HAVE SIR > 1.25 TO QUALIFY)

ENGINEER'S	EER'S O	OPINION OF PROBABLE COST					SHEET	-	R	1
PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Wo	od, MO			DATE PREPARED	PARED	18-	18-Feb-96
ENGINEER	Œ	E M C Engineers, Inc.					ESTIMATOR	JR	D.	D. Sinz
		Denver, CO					СНЕСКЕВ ВУ	ВУ		A. Niemeyer
		: : :	:	MA	MATERIAL COST	ST		LABOR COST	ΣŢ	
No.	Item Kefer Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-		BUILDING 730								1010
2		INSTALL 3.5" BATT INSULATION ON WALLS								
က										
4										
2	13-1/21	INSTALL 3-1/2" BATT INSULATION	S.F.	20808.0	\$0.18	\$3,772	1-CARP	0.007	\$3,827	\$7,598
ဖ ၊		INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	19798.0	\$0.20	\$3,966	2-CARP	0.017	\$17,685	\$21,651
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		INSTALL 2"x4" STUDDED WALL 2' OC	۳	12007.0	\$0.24	\$2,829	!	0.00	\$5,955	\$8,785
x	HCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	20808.0	\$0.07	\$1,390	_	0.01	\$5,022	\$6,412
ກ :	K2SSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	0.9	\$0.00	\$0	1-CARP	0.533	\$84	\$84
2	KEWMH	RELOCATE 6' BASEBOARD RADIATION	Œ.	0.66	\$18.39	\$1,821	Q-6	4.68	\$40,526	\$42,347
- 3	ADY I	RELOCATE DRYER VENT	E.	0.9	\$11.45	69\$	1-CARP	1.3	\$205	\$274
12	KELS	RELOCATE ELECTRICAL LIGHT SWITCH	Ä	15.0	\$8.85	\$132	1-ELEC	0.844	\$385	\$518
13	REO	RELOCATE ELECTRICAL OUTLET	Ä	12.0	\$7.97	\$96	1-ELEC	0.896	\$327	\$423
14	REP	RELOCATE ELECTRICAL PANEL	EA.	3.0	\$0.00	\$0	1-ELEC	12.191	\$1,113	\$1,113
15	RSS	RELOCATE SLOP SINK	EA.	3.0	\$38.33	\$115	<u>6</u>	5.67	\$958	\$1,073
16	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	\$0.96	\$962	2-CARP	0.02	\$1,061	\$2,026
17	ည်	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	\$1.83	\$1,850	2-TILE	0.084	\$4,109	\$5,959
18										
19										
20										
21										
72										
23										
24										
25										
27		SUBTOTAL				\$17,004			C04 250	800 263
28	DIFF	DIFFICULTLY FACTOR			20%	00'-			64,100	496,203
29		SUBTOTAL		:	8	447 004			000,14	44,000
30	HO	OVERHEAD			100.1	417,004			775,004	\$102,320
31					06.71	\$2,891			\$14,505	\$17,395
5 6		SOBIOINE				\$19,895			\$99,827	\$119,722
35	2	PROFIL			10%	\$1,989			\$9,983	\$11,972
3	İ	SUBTOTAL				\$21,884			\$109,810	\$131,694
8 7	CONI	CONTINGENCY		:	20%	\$4,377			\$21,962	\$26,339
SS	IOIAL COSI					\$26,261			\$131,772	\$158,033

LIFE CYCLE COST ANALYSIS SUMMARY

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1				LIFE CYCLE	E COST ANALYSIS S	SUMMARY		
			ENER	GY CONSERV	ATION INVESTMENT	Γ PROGRAM (ECIP)		
		LOCATION:	Fort Leonar	d Wood	REGION: 2 (Missour	ri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Ene	rgy Study, Ins	ulate Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	IN∨	YESTMENT:	BLDG 730	· INSTALL 1.5'	" RIGID INSULATION	ON WALLS		
	Α.	CONSTRUCTION COS	ST	=			\$162,729	
	В.	SIOH COST	(7	.0% of 1A) =			\$11,391	
	c.	DESIGN COST	(6	.0% of 1A) =			\$9,764	
1	D.	TOTAL COST	(1A	+1B +1C) =			\$183,884	
	E.	SALVAGE VALUE OF	EXISTING E	QUIPMENT =			\$0	
ĺ	F.	PUBLIC UTILITY COM	IPANY REBA	TE =			\$0	
	G.	TOTAL INVESTMENT	•	1D -1E -1F) =			>	\$183,884
2.	FNF	ERGY SAVINGS (+) OF	R COST (-):					
l-'		TE OF NISTIR 85-3273		OR DISCOUNT	FACTORS:	JAN '96	•	
		ENERGY	FUEL COS	SAVINGS		DISCOUNT	DISCOUNTED	
		SOURCE		MBTU/YR (2)		FACTOR (4)		
	Α.	ELECT.	\$7.33	0	\$0	13.80		
		DIST	\$0.00	0	\$0		\$0	
		NAT GAS	\$5.30	278.90	\$1,478	17.76	\$26,252	
	D.	COAL	\$0.00	0	\$0		\$0	
	E.	ELEC. DEMAND			\$0	13.47	\$0	
	F.	TOTAL		278.90	\$1,478		>	\$26,252
3.	NO	N-ENERGY SAVINGS (-	+) OR COST	(-)				
	Α.	ANNUAL RECURRING						
		1 ANNUAL MAINTEN	IANCE		\$0	14.88	\$0	
		2			\$0	14.88	\$0	
		3			\$0	14.88	\$0	
		4 TOTAL ANNUAL D	ISC. SAVING	is (+) / COST	\$0		\$0	
	В.	NON-RECURRING (+)	'-)					
		ITEM		SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
				COST(-) (1)	OCCURRENCE (2)	FACTOR (3)	SAVINGS/COST (4)	
			•			(TABLE A-2)	
		a. BASELINE EQUIP. R	EPLCMNT.	\$0			\$0	
		b.					\$0	
		c.					\$0	
		d.					\$0	
		e.					\$0	
		f. TOTAL		\$0			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTE	D SAVINGS (+	+) OR COST (-)	(3A4 + 3Bf4) =		\$ 0
4.	FIR	ST YEAR DOLLAR SAV	'INGS (+) / C	OSTS (-)	(;	2F3+3A4+(3Bf1/8	Economic Life))	\$1,478
5.	SIM	IPLE PAYBACK (SPB) II	N YEARS (MU	JST BE < 10 Y	YEARS TO QUALIFY)	(1G/4) =		124.40
6.	TO	TAL NET DISCOUNTED	SAVINGS			(2F5 + 3C) =		\$26,252
7.	DIS	COUNTED SAVINGS-T	O-INVESTME	NT RATIO (SIF	R)	(6/1G) =		0.14
II								

(MUST HAVE SIR > 1.25 TO QUALIFY)

ENGIN	EER'S O	ENGINEER'S OPINION OF PROBABLE COST					SHEET	-	OF	-
PROJECT	 	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood Wall, MO	eonard Woo	od Wall, MC			DATE PREPARED	PARED	18-F	18-Feb-96
ENGINEER	ij.	E M C Engineers, Inc.					ESTIMATOR	X.	Ö	D. Sinz
		Denver, CO					СНЕСКЕD ВҮ	BY	A. Ni	Niemeyer
•				MA	MATERIAL COST	ST	1	LABOR COS	1	
No.	Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
_		BUILDING 730								!!
2		INSTALL 1.5" RIGID INSULATION ON WALLS								
က										
4										
2	11-1/2RI		S.F.	20808	\$0.59	\$12,308	1-CARP	0.008	\$4,373	\$16,681
ဖ	Ω :	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	19798	\$0.20	\$3,966	2-CARP	0.017	\$17,685	\$21,651
7	IFS	INSTALL 3/4"x2" FURRING STRIPS	Ļ.	4767	\$0.19	\$910	1-CARP	0.016	\$2,004	\$2,913
ω (TCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	20808	\$0.07	\$1,390	1-PORD	0.01	\$5,022	\$6,412
ი (KZSSS	RELOCATE 2' STAINLESS STEEL SHELF	EA.	0.9	\$0.00	\$0	1-CARP	0.533	\$84	\$84
10	R6WMH	RELOCATE 6' BASEBOARD RADIATION	Ë	99.0	\$18.39	\$1,821	9-0	4.68	\$40,526	\$42,347
= 5	KUV		EA.	0.0	\$11.45	69\$	1-CARP	1.3	\$205	\$274
12	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	E.	15.0	\$8.85	\$132	1-ELEC	0.844	\$385	\$518
13	REO	RELOCATE ELECTRICAL OUTLET	EA.	12.0	\$7.97	96\$	1-ELEC	0.896	\$327	\$423
4	REP	RELOCATE ELECTRICAL PANEL	EA.	3.0	\$0.00	0\$	1-ELEC	12.191	\$1,113	\$1,113
15	RSS	RELOCATE SLOP SINK	EA.	3.0	\$38.33	\$115	Ġ	5.67	\$958	\$1,073
16	IWB-5/8	INSTALL 5/8" WATERPRF BRD - TAPED & SANDE	S.F.	1010.0	\$0.96	\$962	2-CARP	0.02	\$1,061	\$2,026
17	C1	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	1010.0	\$1.83	\$1,850	2-TILE	0.084	\$4,109	\$5,959
9										
13										
20										
21		77,30			7					
22										
23										
25				:						
26										
27		SUBTOTAL				\$23,620			\$77,855	\$101,475
78	DIFF	DIFFICULTLY FACTOR			2%				\$3,893	\$3,893
53		SUBTOTAL				\$23,620			\$81,747	\$105,367
က	용	OVERHEAD			17%	\$4,015			\$13,897	\$17,912
31		SUBTOTAL				\$27,635			\$95,644	\$123,280
32	PRO	PROFIT			10%	\$2,764			\$9,564	\$12,328
33		SUBTOTAL				\$30,399			\$105,209	\$135,608
34		CONTINGENCY			20%	\$6,080			\$21,042	\$27,122
35	IOTAL COST	ST				\$36,479			\$126,251	\$162,729

E M C ENGINEERS,	INC					DATE:	Feb-96
PROJECT: LIMITED ENERGY S		RICK BUILI	DINGS			BY:	
CLIENT CONTRACT NO.: DAC	•					JOB:	1406.011
						-	
LOCATION: FT LEONARD WO	OD, MO.					CHK: _ FILE:	730BHL
						FILE:	/30BHL
BUILD	ING HEATING I	LOAD C	ALCULA	TION SHEE	T		
BLDG NO: 730	BLDG NAME:	BARRACK	s withou	T AC			
BLDG FUNCTION:	•						
FLOOR AREA: (SQ. FT)	40,986					# FLOORS	3
SLAB PERIMETER: (FT)	514						
I. AREAS: ([] FIELD VERIFIED	DELEVATION PLANS	S)					
	(0.0 ==)	NORTH	SOUTH	EAST	WEST	TOTAL	
WALLS, GROSS GLASS	(SQ. FT) (SQ. FT)	9,088 467	9,088 435	1,845 17	1,845	21,866 938	
PERSONNEL DOOR	(SQ. FT)	80	40	0	0	120	
INSULATED PANEL	(SQ. FT)	233	217	9	9	468	
WALLS, NET	(SQ. FT)	8,308	8,396	1,819	1,817	20,341	
ROOF AREA (OR CEILING AREA	(SQ. FT)		D) PERSONNE	EL DOOR	(SQ. FT)	13,662 120	
BASEMENT WALLS	(SQ. FT)	0	0	0	(SQ. F1)	0	
II. CONSTRUCTION: ([] FIELI		ROOF WIN					
WALLS: (SKETCH CROSS SEC		1001, 1111	DOW, DOC		OMPONEN	TS I	R-VALUE
					OUTSIDE		0.17
					4" FACE		0.43
					AIR SPAC	9" L.W. CONC.	0.91 3.00
				5.	+ CIVIO /	S E.W. CONC.	0.00
				6.			
				7.	INSIDE AI		0.68
					TOTAL	R-WALL = U = 1/R	5.19 0.193
						0-1/K	0.133
ROOF: (SKETCH CROSS SECT	ION OF ROOF)			CC	MPONEN	TS	R-VALUE
					OUTSIDE		0.17
					BUILT UP 2" INSULA		0.34 8.00
					7" L.W. C		6.25
				5.			
				6.	INCIDE AL	D 51114	0.00
				' -	INSIDE AI	R-ROOF =	0.68 15.44
						U=1/R	0.065

GLASS TYPE:	PPG 'PENNVERN	ON' C.L. T	WNDV, SS	A, .88 S.C.		R-GLASS	1.61
SLAB TYPE FLOOR: BASEMENT TYPE:	CEMENT NONE					SLF R-BASEM.	0.83
INSULATED PANEL:						R-PANEL	4.20
PERSONNEL DOOR TYPE:	METAL					R-PDOOR	2.56
III. INFILTRATION:							
TIGHT WALL H/M/L (SQ.FT.)	11	24000	X CFM /		0.042	=	0
AVG. WALL H/M/L (SQ.FT.) LEAKY WALL H/M/L (SQ.FT.)	Н	21866	X CFM /		0.138	=	3,018
DOOR OPENINGS / HR - SINGLI	E DOOR	50		OPENING /HR	1.600	=	80
DOOR OPENINGS / HR - DOUBL		50	X CFM /	OPENING /HR	1.385	=	69
			TOTAL INF	ILTRATION (CI	FM)	=	3167
UA PANEL	PANEL AREA	468		X PANEL "U"	0.238	=	111
L	PDOOR AREA	120		X DOOR "U"	0.391	=	47
UA PDOOR				X WALL "U"	0.193	=	3,917
UA PDOOR UA WALL	WALL AREA	19,873		V DOOF "II"	0.005		^^-
UA PDOOR UA WALL UA ROOF	WALL AREA ROOF AREA	13,662		X ROOF "U"	0.065 0.621	=	885 582
UA PDOOR UA WALL	WALL AREA			X ROOF "U" X GLASS "U" X SLF	0.065 0.621 0.830	=	885 582 427
UA PDOOR UA WALL UA ROOF UA GLASS	WALL AREA ROOF AREA GLASS AREA	13,662 938		X GLASS "U"	0.621	=	582
UA PDOOR UA WALL UA ROOF UA GLASS UA SLAB	WALL AREA ROOF AREA GLASS AREA SLAB PERIM.	13,662 938 514		X GLASS "U" X SLF	0.621 0.830	=	582 427

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

FILE: BLDG:

DATE: 26-Jan-96

PREPARED BY: CHECKED BY:

DMS AJN

ZONE:

730ZN1 730

	Ra	ates of	Heat Gain from Occupants of Cor	nditioned Spaces				
Zone No.	No. of People	Activity Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat (BTU/H)
1	125	4	Seated, light work, typing	Offices, hotels, a	250	200	31,250	25,000
ТОТ	125					TOTAL	31,250	25,000

			Peak Wattage Value for Lights		
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/Fixture	Total Wattage
1	18	5	Fluorescent, 1 - 34w lamp, 16w ballast (1x4 ft. fixture)	50	900
	76	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	6,384
	64	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	10,752
	102	18	Incandescent - 60w	60	6,120
тот	260			TOTAL	24,156

			Peak Value for Internal Gains				
Zone No.	No. of Equipment	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	otal Wattag	Total (BTU)
1	6			512	20%	3,072	10,485
	6	23	Clothes Dryer	4,856	45%	29,136	99,441
			The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s				
				TOTAL	43%	32,208	109,926

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE: PREPARED BY: 26-Jan-96 DMS

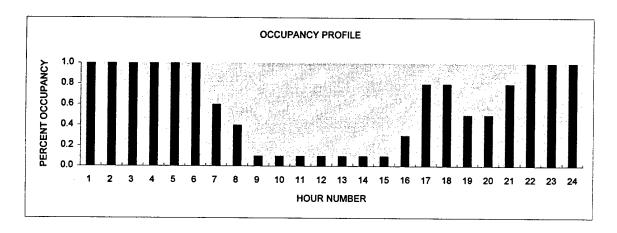
CHECKED BY:

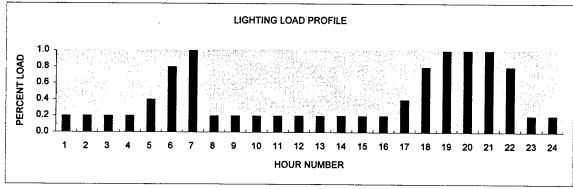
AJN 730ZN1

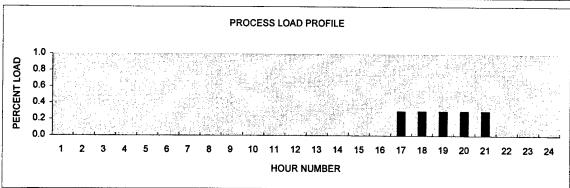
FILE: BLDG: ZONE:

730

BLDG	BLDG	TYPE OF										HOU	R NU	MBER	1							•				
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	თ	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Barracks	OCCUPANC	1.0	1.0	1.0	1.0	1.0	1.0	0.6	0.4	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.3	0.8	0.8	0.5	0.5	0.8	1.0	1.0	1.0
	1	LIGHTING	0.2	0.2	0.2	0.2	0.4	0.8	1.0	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.4	0.8	1.0	1.0	1.0	0.8	0.2	0.2
	<u> </u>	PROCESS	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.3	0.3	0.3	0.0	0.0	0.0







D9-12

BLDG 730 - BARRACKS WITHOUT A/C BASELINE ----- PROGRAM CONTROL OPTIONS -----COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA -----*****REAL WEATHER FROM DISK****** FILE NAME MO STATION 13995 YEAR 1955 SITE LATITUDE DEG (AL1) 37.750000 1158.000000 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 56.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 0.000000E+00 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000 FLOOR AREA (SQFT) 40986.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000 INFILTRATION PROFILE .670 .670 .670 .670 .670 .670 .670

 1.00
 1.00
 1.00
 1.00

 .670
 .670
 .670
 .670

 1.00 1.00 1.00 1.00 1.00 1.00 .670 1.00 .670 A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01 B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02 C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 47.000000 30 WINDOW GLASS NUMBER (NG) DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01 WINDOW SHADING FACTOR (SHD) 5.900000E-01

מדבת זוזבש

	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	8613.0	1828.0	8541.0	1826.0
WINDOW AREA SQFT (AWND)	435.0	18.5	467.0	17.2
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	43.5	1.9	46.7	1.7
WIDTH OF OVERHANG (WOH)	2.5	2.5	2.5	2.5
OVERHANG HGT ABV WNDW (HOH)	1.0	1.0	1.0	1.0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.194	.193	.194	.194
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.01454	.01447	.01454	.01454
NUMBER OF BN FACTORS (NB	5	5	5	5
RN FACTORS PM (PM)				
N=1	.00002	.00002	.00002	.00002
N=2	.00224	.00223	.00224	.00224
N=3	.00805	.00801	.00805	.00805
N=4	.00394	.00392	.00394	.00394
N= 5	.00029	.00029	.00029	.00029
N=6	*****	*****	******	*****
N=1 N=2 N=3 N=4 N=5 N=6 NUMBER OF DN FACTORS (ND) DN FACTORS N=1	5	5	5	5
DN FACTORS				
N=1 N=2 N=3 N=4 N=5	1.00000	1.00000	1.00000	1.00000
N=2	-1.50943	-1.50943	-1.50943	-1.50943
N=3	.65654	.65654	.65654	.65654
N=4	07415	07415	07415	07415
N=5	.00212	.00212	.00212	.00212
N=6	*****	*****	*****	*****
ROOF AREA SQFT (AROF) 13662	.000000			
ROOF U VALUE BTU/HR-SQFT-F (URI	F) 6.50	0000E-02		
ROOF TRANS FUNCTIONS USED (1=YF	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	1.0784	09E-03		
ROOF B TRANSFER FUNCTIONS (BNR))			
.000 .111E-03 .561E-03	.369E-03	.369E-04	738.	
ROOF D TRANSFER FUNCTIONS (DNR))			
1.00 -1.46 .533 -	611E-01	.820E-03	999.	
SKYLIGHT TILT DEGREES (TILT)	0.0000001	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0.0	00000E+00			
SKYLIGHT WIDTH FT (SKW) 0.00	0000E+00			
SKYLIGHT OVERHANG WIDTH FT (SKC	0.00 (WC	0000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0.	.000000E+00)	
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH	SHSK (MST,	NDST)	1	1
SUMMER END MONTH AND DAY FOR SH	ISK (MND, NI	ND)	1	1
SKY LIGHT AREA SQFT (ASKY) 0	.000000E+0	00		
DAYTIME SKY LIGHT U BTU/SQFT-HR	-F (SKYU)	1.2	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT-	HR-F (SKYU	JN)	1.292998	
FRACTION OF PROCESS HEAT TO INT	ERNAL SPAC	E (FAP)	4.300000E	-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	HO	OURLY FRAC	TION OF PE	AK		
1	.200	.000	1.000	1.000	72.0	. 0
2	.200	.000	1.000	1.000	72.0	.0
3	.200	.000	1.000	1.000	72.0	.0
4	.200	.000	1.000	1.000	72.0	.0
5	.400	.000	1.000	1.000	72.0	.0
6	.800	.000	1.000	1.000	72.0	. 0
7	1.000	.000	.600	.600	72.0	.0
8	.200	.000	.400	.400	72.0	.0

9	.200	.000	.100	.100	72.0		. 0				
10	.200	.000	.100	.100	72.0		.0				
11	.200	.000	.100	.100	72.0		.0				
12	.200	.000	.100	.100	72.0		.0				
13	.200	.000	.100	.100	72.0		.0				
14	.200	.000	.100	.100	72.0		.0				
15	.200	.000	.100	.100	72.0		.0				
16	.200	.000	.300	.300	72.0		. 0				
17	.400	.300	.800	.800	72.0		. 0				
18	.800	.300	.800	.800	72.0		. 0				
19	1.000	.300	.500	.500	72.0		.0				
20	1.000	.300	.500	.500	72.0		.0				
21	1.000	.300	.800	.800	72.0		. 0				
22	.800	.000	1.000	1.000	72.0		. 0				
23	.200	.000	1.000	1.000	72.0		. 0				
24	.200	.000	1.000	1.000	72.0		.0				
NO HEAT	ING ABOVE AMB	IENT TEMP.			.000000						
NO COOL	ING BELOW AMB	IENT TEMP.	OF (TCLK	OT) 100	.000000						
SYSTEM	TYPE, (IECN)	2	}								
SUPPLY	SUPPLY AIR CFM (SACFM) 0.000000E+00										
ECONOMI	ZER HIGH TEMP	LIMIT F	0.00000	0E+00							
	SUPPLY AIR ST.										
SYSTEM	SUPPLY AIR ST	OP TIME HE	0.000	000E+00							
	MIXED AIR TEM										
MIN OUT	SIDE AIR FRAC	TION OF SA	CFM (OAFR)	0.0000	00E+00						
	FAN EFFICIENCY (EFAN) 1.000000E-05										
	AL PRESSURE I										
HEATING PLANT RATED OUTPUT BTU (HFLOT) 1700000.000000											
HEATING PLANT RATED INPUT BTU (HFLIN) 2125000.000000											
	PLANT PART LO			r table (pli							
.100	.191	.200	.286	.300	.369	.400	.451				
.500	.537	.600	.625	.700	.718	.800	.812				
.900	.906	1.00	1.00								
	TYPE (ITYPCH)		0								
COOLING PLANT RATED OUTPUT BTU (CFLOT) 1.000000E-10											
COOLING PLANT RATED INPUT BTU (CFLIN) 0.000000E+00 COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)											
10.0	16.0	20.0	22.0			40.0	34.5				
50.0			50.0	70.0	60.0	80.0	71.5				
90.0	85.0	100.	100.								

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTITN	ſ				
			SOLAR		DOOR				VENT	
			THRU		AND				AND	
	H LOAD				F SLAB	BSMT	WALL			LATENT
JAN	0.	GAIN	14.	0.	. 0.	0.	0.	Ο.	0.	0.
	-401.	LOSS		-26	-1.	0.	-89.	-14.	-326.	0.
FEB	0.	GAIN	16.	0 .	. 0.	0.	0.	0.	0.	0.
	-324.	LOSS		-23		0.	-68.	-12.	-276.	0.
MAR	0.	GAIN	21.			0.	4.	0.	0.	0.
	-264.	LOSS		-20.	-1.	0.	4. -55.	-11.	-245.	0.
	0.		20.	0.	0.	0.	11.	0.	2.	0.
	-111.	LOSS		-12.	-1.	0.	-28.	-6.	-135.	0.
	.00		22.56	.00			17.67	.10	1.73	.00
	-18.40	LOSS		-6.45	42	.00	-14.67	-4.29 -	-76.02	.00
JUN	.00	GAIN	23.02	.00	.00	.00	19.43	.05	. 90	.00
		LOSS		-5.00			-11.30			.00
JUL	.00	GAIN	23.12	.00	.01	.00	19.95	.13	2.27	.00
	.00	LOSS		-4.96	37		-11.93			.00
AUG	.00				.01	.00	17.39	.14	2.51	.00
	.00	LOSS		-5.22	36	.00	-12.39	-3.69 -	-62.64	.00
SEP	.00	GAIN	17.38	.00	.01	.00	13.80	.14	2.63	.00
	-23.50				39		-15.50			.00
OCT	0.	GAIN	16.		0.	0.	6.	0.	2.	0.
	-100.	LOSS		-12.	-1.	0.	-30.	-6.	-117.	0.
NOV			13.	0.		0.	2. -52.	0.	0.	0.
	-205.	LOSS		-18.	-1.	0.	-52.	-9.	-182.	0.
DEC			12.	0.	0.	0.	Ο.	0.	0.	0.
	-387.	LOSS		-27.	-1.	0.	-90.	-13.	-310.	0.
	0.				0.					0.
	-1834.	LOSS		-166.	-9.	0.	-478.	-90	1934.	0.
MAX	HEATING	LOAD=	-1235	978.	BTUH ON DI	EC 18	нопв з	ΔMΩT	באידי ידאם	2
MAX	COOLING	LOAD=	2233	0.	BTUH ON DI BTUH ON DI	EC 31	HOUR 24	AMBI	ENT TEMP	42.

ZONE UA BTU/HR-F 5551.3

BEACON Energy Analysis By EMC Engineers, Inc. 730.I

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

									FAN TO	OTAL
INTERN		ד ג זא ס	SPACE		_	COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
			URE F			CIDENT	THOUSAND		MILLION	
MONTH							KWH	BTU	BTU	BTU
JAN	72.	72.	71.	4 1		57. 42.	7.64	5.11	.00	42.22
FEB	72.	72.	71.	26 2		51. 14.	6.90	4.62	.00	38.14
MAR	72.	77.		28	21	63.	7.64	5.11	.00	42.22
			71.	4	5	15.				
APR	73.	83.	72.	30 9		67. 31.	7.39	4.95	.00	40.86
MAY	77.	88.	72.	29 11	22 4	68. 38.	7.64	5.11	.00	42.22
JUN	83.	93.	75.	29 17		75. 70.	7.39	4.95	.00	40.86
JUL	87.	97.	75.	15	22	83. 68.	7.64	5.11	.00	42.22
AUG	86.	93.	74.	29	21	76.	7.64	5.11	.00	42.22
SEP	79.	93.		2	21	80.	7.39	4.95	.00	40.86
OCT	74.	84.	72.	18 4	9 22	66. 69.	7.64	5.11	.00	42.22
001	,	• • • • • • • • • • • • • • • • • • • •	72.			68.		5.22		
NOV	72.	77.	71.	8 14	22 16	67. 67.	7.39	4.95	.00	40.86
DEC	72.	72.	71.		21 8	52. 1.	7.64	5.11	.00	42.22
YEAR							89.95	60.18	.00	497.12

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
JAN	744	0	0	0	1161E+07	.0000
FEB	668	0	0	0	1015E+07	.0000
MAR	654	0	0	_	1061E+07	.0000
APR	399	0	0		5996E+06	.0000
MAY	125	0	0		3697E+06	.0000
JUN	0	0	0	0	.0000	.0000
JUL	0	0	0	0	.0000	.0000
AUG	0	0	0	0	.0000	.0000
SEP	149	0	0	_	3277E+06	.0000
OCT	437	0	0	_	5227E+06	.0000
NOV	614	0	0	_	7663E+06	.0000
DEC	740	0	0		1236E+07	.0000
YEAR	4530	Ō	0	-	1236E+07	.0000

BEACON Energy Analysis By EMC Engineers, Inc.

730.I

SYSTEM TOTALS

MONTE	HEATING MILLION H BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	606.86	.00	7.64	5.11	.00	42.22	24.2
FEB	507.40	.00	6.90	4.62	.00	38.14	24.2
MAR	441.89	.00	7.64	5.11	.00	42.22	24.2
APR	218.10	.00	7.39	4.95	.00	40.86	24.2
MAY	54.74	.00	7.64	5.11	.00	42.22	24.2
JUN	.00	.00	7.39	4.95	.00	40.86	24.2
JUL	.00	.00	7.64	5.11	.00	42.22	24.2
AUG	.00	.00	7.64	5.11	.00	42.22	24.2
SEP	65.51	.00	7.39	4.95	.00	40.86	24.2
OCT	216.11	.00	7.64	5.11	.00	42.22	24.2
NOV	372.66	.00	7.39	4.95	.00	40.86	24.2
DEC	590.81	.00	7.64	5.11	.00	42.22	24.2
YEAR	3074.08	.00	89.95	60.18	.00	497.12	24.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 83962. BTU/(SQFT-YEAR)

BLDG 730 - BARRACKS WITHOUT A/C BASELINE

OTHER MONTHLY STATISTICS

	CLEAR							100		
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					HOUR	S WHEN	MAXIMUM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS	TEM	SYSTE	M LOADS	COOLING	
	BTU/	BTU/		AMBT.	TEMP. D	RIFT	NOT	MET	LOAD	LOAD
	SQFT-	SQFT~	PF	DEG.	DEG.	F	COOL	HEAT	BTU	BTU
MONTH	DAY	DAY	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1161E+07
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	1015E+07
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	1061E+07
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	5996E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	3697E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	3277E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	5227E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	7663E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	~.1236E+07

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ----- PROGRAM CONTROL OPTIONS ------COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 0
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC) WEEKEND INTERNAL GAINS FACTOR (WKEND) 1.000000 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) SKY CLEARNESS FACTOR (CLN) 1.000000 NUMBER OF ZONES (NZ) WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW) ----- SITE AND BUILDING DATA -----*****REAL WEATHER FROM DISK****** FILE NAME MO STATION 13995 YEAR 1955 37.750000 SITE LATITUDE DEG (AL1) ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01 SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 0.000000E+00 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000 FLOOR AREA (SQFT) 40986.000000 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000 CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000 INFILTRATION PROFILE 1.00 1.00 1.00 1.00 1.00 .670 .670 .670 IN INFILITEDATION ROSE .670 .670 .670 .670 .670 .670 .670 1.00 1.00 1.00 1.00 .670 .670 .670 .670 1.00 A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03 BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000 BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00 SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00 PARTITION UA BTU/HR-F (GUA) 0.000000E+00 DOOR UA BTU/HR-F (DUA) 47.000000 WINDOW GLASS NUMBER (NG) 30 DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01 NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01 WINDOW SHADING FACTOR (SHD) 5.900000E-01 WALL DATA WALL NUMBER 1 2 3 .00 90.00 180.00 -90.00 AZIMUTH ANGLE (AZ) WALL AREA SQFT (AWLL) 8613.0 1828.0 8541.0 1826.0 WINDOW AREA SQFT (AWND) 435.0 18.5 467.0 10.0 10.0 10.0 WINDOW HEIGHT FT (WNDH) WINDOW WIDTH FT (WNDW) 43.5 1.9 46.7 1.7 WIDTH OF OVERHANG (WOH) 2.5 2.5 2.5 0VERHANG HGT ABV WNDW (HOH) 1.0 1.0 1.0 1.0

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	120.0 .060	120.0 .060	120.0 .060	120.0 .060
	00165	00165	00165	00165
ATTACHED OF DAY PAGEODG (AD	.00165		.00165	
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1			.00000	
N=2	.00015	.00015	.00015	
N=3	.00081	.00081	.00081	.00081
N=4	.00062	.00062	.00062	.00062
N=5	.00008	.00008	.00008	.00008
	*****	*****	******	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=2			-1.71064	
N=3	.89735		.89735	
N=4	16643	16643	16643	
N=5				
N=6	00002	00002	.00728 00002	00002
ROOF AREA SQFT (AROF) 13662				
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)			1	
ROOF C TRANSFER FUNCTION (CNR)	1 0784	09E-03	-	
ROOF B TRANSFER FUNCTIONS (BNR		032 03		
.000 .111E-03 .561E-03		369E-04	738	
ROOF D TRANSFER FUNCTIONS (DNR)		.3056	,30.	
1.00 -1.46 .533		820E-03	999	
SKYLIGHT TILT DEGREES (TILT)	0 000000	E+00	300.	
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.0			000	
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO		00000E±00		
OVERHANG HEIGHT ABOVE SKYLIGHT			00E±00	
SKYLIGHT GLASS NUMBER (NS)		0.0000	001-00	
SKYLIGHT SHADING COEFFICIENT (S		0000008±0	0	
SUMMER START MONTH AND DAY FOR	SHSK (MST	MDST)	1	1
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH	ISK (MNID NI	, NDSI,	1	1
SKY LIGHT AREA SQFT (ASKY)	O O O O O O F + O	nn	1	1
DAYTIME SKY LIGHT U BTU/SQFT-HE	2-F (SKVII)	3 T	20200	
NIGHT TIME SKYLIGHT U BTU/SQFT-	-HR-F (SKVI	TNI)	1 292999	
FRACTION OF PROCESS HEAT TO INT	TERNAL SDA	CE (FAD)	4 300000	F_01
The state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the s	LEAN WEAN	(LAF)	4.500000	D OI
TATOTANA			_	

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					POINT D	EG F
	KW		BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	ENSIBLE	LATENT	HEATING	COOLING
VAL	24.	47268.	31250.	25000.		
JR -	H	OURLY FRACT	ION OF PE	AK		
	.200	.000	1.000	1.000	72.0	.0
	.200	.000	1.000	1.000	72.0	.0
	.200	.000	1.000	1.000	72.0	.0
	.200	.000	1.000	1.000	72.0	.0
	.400	.000	1.000	1.000	72.0	.0
	.800	.000	1.000	1.000	72.0	.0
	1.000	.000	.600	.600	72.0	.0
	.200	.000	.400	.400	72.0	.0
		LIGHTS VAL 24. R H .200 .200 .200 .200 .200 .400 .800 1.000	LIGHTS PROCESS S VAL 24. 47268. R HOURLY FRACT .200 .000 .200 .000 .200 .000 .200 .000 .400 .000 .800 .000 1.000 .000	PEOPLE LIGHTS PROCESS SENSIBLE VAL 24. 47268. 31250. R HOURLY FRACTION OF PE .200 .000 1.000 .200 .000 1.000 .200 .000 1.000 .200 .000 1.000 .200 .000 1.000 .200 .000 1.000 .200 .000 1.000 .200 .000 1.000 .400 .000 1.000 .800 .000 1.000	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT VAL 24. 47268. 31250. 25000. R HOURLY FRACTION OF PEAK200 .000 1.000 1.000 .200 .000 1.000 1.000 .200 .000 1.000 1.000 .200 .000 1.000 1.000 .200 .000 1.000 1.000 .200 .000 1.000 1.000 .200 .000 1.000 1.000 .200 .000 1.000 1.000 .200 .000 1.000 1.000 .400 .000 1.000 1.000 .800 .000 1.000 .600	PEOPLE PEOPLE LIGHTS PROCESS SENSIBLE LATENT HEATING VAL 24. 47268. 31250. 25000. R HOURLY FRACTION OF PEAK200 .000 1.000 1.000 72.0 .200 .000 1.000 1.000 72.0 .200 .000 1.000 1.000 72.0 .200 .000 1.000 1.000 72.0 .200 .000 1.000 1.000 72.0 .200 .000 1.000 1.000 72.0 .200 .000 1.000 1.000 72.0 .200 .000 1.000 1.000 72.0 .400 .000 1.000 1.000 72.0 .800 .000 1.000 1.000 72.0

9	.200	.000	.100	.100	72.0		.0
10	.200	.000	.100	.100	72.0		.0
11	.200	.000	.100	.100	72.0		.0
12	.200	.000	.100	.100	72.0		.0
13	.200	.000	.100	.100	72.0		. 0
14	.200	.000	.100	.100	72.0		.0
15	.200	.000	.100	.100	72.0		.0
16	.200	.000	.300	.300	72.0		.0
17	.400	.300	.800	.800	72.0		.0
18	.800	.300	.800	.800	72.0		. 0
19	1.000	.300	.500	.500	72.0		.0
20	1.000	.300	.500	.500	72.0		. 0
21	1.000	.300	.800	.800	72.0		. 0
22	.800	.000	1.000	1.000	72.0		.0
23	.200	.000	1.000	1.000	72.0		. 0
24	.200	.000	1.000	1.000	72.0		. 0
NO HEAT	ING ABOVE AMB				000000		
NO COOL	ING BELOW AMB	IENT TEMP.	OF (TCLK	OT) 100.	.000000		
SYSTEM 1	TYPE, (IECN)	2	!				
SUPPLY A	AIR CFM (SACFI	M) 0.000	000E+00				
ECONOMIZ	ZER HIGH TEMP	LIMIT F	0.00000	DE+00			
SYSTEM S	SUPPLY AIR STA	ART TIME H	IR 0.000	000E+00			
SYSTEM S	SUPPLY AIR STO	OP TIME HR	0.000	000E+00			
SYSTEM N	MIXED AIR TEM	P(TMXAIR)	55.00	0000			
MIN OUTS	SIDE AIR FRACT	TION OF SA	CFM (OAFR)	0.00000	00E+00		
FAN EFFI	CIENCY (EFAN)	1.000	000E-05				
FAN TOTA	AL PRESSURE II	N. WATER	(DP) 0	.000000E+00			
HEATING	PLANT RATED (OUTPUT BTU	(HFLOT)	1700000.0000	000		
HEATING	PLANT RATED	INPUT BTU	(HFLIN)	2125000.0000	000		
HEATING	PLANT PART LO	DAD VS FRA	C OF INPU	TABLE (PL	I)		
.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				
CHILLER	TYPE (ITYPCH))	0				
COOLING	PLANT RATED (OUTPUT BTU	(CFLOT)	1.000000E	E-10		
COOLING	PLANT RATED	INPUT BTU	(CFLIN)	0.00000E+	-00		
COOLING	PLANT PART LO	DAD FRAC V			:)		
10.0	16.0	20.0	22.0	30.0	28.5	40.0	34.5
50.0	42.5	60.0	50.0		60.0	80.0	71.5
90.0	85.0	100.	100.				

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITN DOOR AND				VENT AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	.0	GAIN	14.	0.	0.	0.	0.	0.		0.
	-339.	LOSS		-26.	-1.	0.	-27.	-14.	-326.	0.
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-278.	LOSS		-23.			-21.			0.
MAR	0.	GAIN	21.	Ο.	0.	0.	0.	0 -	0	0.
	-228.	LOSS		-20.	-1.		-16.			0.
APR	0.	GAIN	20.	0.	0.	0.	2.	0 .	2	0.
	-96.			-12.	-1.	0.	2. -7.	-6.	-133.	0.
MAY	.00	GAIN	22.56	.00	.01	. 0.0	3.32	10	1.72	.00
	-15.16	LOSS		-6.04	40	.00				.00
JUN	.00	GAIN	23.02	.00	.00	.00	3.90	05	80	.00
	.00	LOSS		-4.58	34		76			.00
JUL	.00	GAIN	23.12	.00	.01	.00	3.94	.12	2.25	.00
	.00	LOSS		-4.56	35	.00		-3.57		.00
AUG	.00	GAIN	20.49	.00	.01	.00	3.16	.13	2.37	.00
	.00	LOSS		-4.94	35		-1.16			.00
	.00		17.38	.00	.01	.00	2.24	.12	2.41	.00
	-19.50	LOSS		-6.83	38	.00	-2.37	-3.92	-72.20	.00
OCT	Ο.		16.	Ο.	0.	0.	1.	Ο.	2.	0.
	-83.	LOSS		-12.	-1.	0.	-8.	-6.	-116.	0.
NOV	0.		13.	Ο.	0.	0.	0. -15.	0.	0.	Ο.
	-170.	LOSS		-18.	-1.	0.	-15.	-9.	-182.	0.
	0.					0.	0.	0.	0.	0.
	-326.	LOSS		-27.	-1.	0.	-28.	-13.	-311.	0.
	0.				0.					0.
	-1554.	LOSS		-164.	-9.	Ο.	-129.	-89	1912.	0.
MAY	НЕ ДТТМС	T.() N.D	_1065	214 Dm	IIII ON DE	a 10 :	HOID 5			
	COOLING				UH ON DE				ENT TEMP	

ZONE UA BTU/HR-F 2764.9

BEACON Energy Analysis By EMC Engineers, Inc. 730FG.I

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

FAN TOTAL

INTERN	AT.								FAN 1	OTAL
	INTE		SPACE URE F			COIN- CIDENT	LIGHTING THOUSAND	PROCESS MILLION		
MONTH	AVG.	MAX	MIN	DAY	HR .	AMBT.	KWH	BTU	BTU	BTU
JAN	72.	72.	71.	4 1		57. 42.	7.64	5.11	.00	42.22
FEB	72.	72.	72.	17 2		59. 15.	6.90	4.62	.00	38.14
MAR	72.	75.	72.				7.64	5.11	.00	42.22
APR	73.	80.	72.				7.39	4.95	.00	40.86
MAY	76.	86.	72.	29 11			7.64	5.11	.00	42.22
JUN	82.	91.	75.	29 17		76. 61.	7.39	4.95	.00	40.86
JUL	87.	95.	76.		21 5		7.64	5.11	.00	42.22
AUG	85.	92.	74.	29 26	20 8		7.64	5.11	.00	42.22
SEP	79.	91.	72.	2 15	21 4	80. 41.	7.39	4.95	.00	40.86
OCT	73.	83.	72.	5 2 9	21 16	69. 67.	7.64	5.11	.00	42.22
NOV	72.	76.	72.	8 6		67. 67.	7.39	4.95	.00	40.86
DEC	72.	72.	72.			70. 1.	7.64	5.11	.00	42.22
YEAR							89.95	60.18	.00	497.12

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

	COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
	INCLUDING	LOADS WE	RE NOT MET	BTU	J
HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
744	n	0	0	- 1004F±07	.0000
	0	•	-		.0000
	0	-			.0000
	0	-			.0000
127	0	•	_		.0000
0	0	•	_		.0000
0	0	_	_		.0000
0	0	_			.0000
155	0	-	_		.0000
450	0	0			.0000
622	0	0	-		.0000
740	0	0	0	1065E+07	.0000
4599	0	0	0	1065E+07	.0000
	744 669 675 417 127 0 0 0 155 450 622 740	INCLUDING	INCLUDING LOADS WE HEATING ECONOMIZER HEATING 744 0 0 0 669 0 0 675 0 0 417 0 0 127 0 0 0 0 0 0 0 0 0 0 0 155 0 0 450 0 0 622 0 0	INCLUDING LOADS WERE NOT MET HEATING ECONOMIZER HEATING COOLING 744 0 0 0 0 669 0 0 0 0 675 0 0 0 0 417 0 0 0 0 127 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 155 0 0 0 0 450 0 0 0	INCLUDING LOADS WERE NOT MET BTO

SYSTEM TOTALS

MONTE	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	543.39	.00	7.64	5.11	.00	42.22	24.2
FEB	459.03	.00	6.90	4.62	.00	38.14	24.2
MAR	411.32	.00	7.64	5.11	.00	42.22	24.2
APR	208.22	.00	7.39	4.95	.00	40.86	24.2
MAY	53.77	.00	7.64	5.11	.00	42.22	24.2
JUN	.00	.00	7.39	4.95	.00	40.86	24.2
JUL	.00	.00	7.64	5.11	.00	42.22	24.2
AUG	.00	.00	7.64	5.11	.00	42.22	24.2
SEP	65.04	.00	7.39	4.95	.00	40.86	24.2
OCT	204.29	.00	7.64	5.11	.00	42.22	24.2
NOV	341.81	.00	7.39	4.95	.00	40.86	24.2
DEC	525.46	.00	7.64	5.11	.00	42.22	24.2
YEAR	2812.35	.00	89.95	60.18	.00	497.12	24.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 77576. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 730FG.I

BLDG 730 - BARRACKS WITHOUT A/C - ECO-1 INSTALL 3.5" FIBERGLASS INSUL.

OTHER MONTHLY STATISTICS

	CLEAR									
	DAY	ACTUAL								
	SOLAR	SOLAR								
	INSOL.	INSOL.								
	HORIZ.	HORIZ.					HOHD	TATELET .	WAVILITA	147.7714771
	SURF.	SURF.		AVG.	MAY CYC	m maa		S WHEN	MAXIMUM	
	BTU/	BTU/	7	MBT.	MAX SYS			M LOADS	COOLING	
	SQFT-	SQFT-	PF		TEMP. D		NOT		LOAD	LOAD
MONTH	-	DAY		DEG.	DEG.	_	COOL	HEAT	BTU	BTU
MONTH	DAI	DAI	FACTOR	F	+	-				
JAN	1041.	675.	1.000	35.	0.	Ο.	0	0	.0000	1004E+07
								·		.10012.07
FEB	1464.	929.	1.000	37.	0.	Ο.	0	0	.0000	8813E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.0000	9128E+06
APR	2312.	1600.	1.000	55.		•	•	•		
AFK	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	4861E+06
MAY	2566.	1826.	1.000	65.	0.	Ο.	0	0	.0000	3038E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	.0000
7777	2546	2015				_	_			
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.0000	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	2708E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	0000	44467 06
001	143/.	,,,,,	1.000	5/.	υ.	υ.	0	0	.0000	4446E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	6366E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	1065E+07

```
BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND)
                                                  1.000000
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
                                                 1
 SKY CLEARNESS FACTOR (CLN) 1.000000
 NUMBER OF ZONES (NZ)
                                 1
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 ******REAL WEATHER FROM DISK******
  FILE NAME MO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1)
                                37.750000
 ELEVATION ABOVE SEA LEVEL IN FEET (ELEV)
                                                1158.000000
 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB)
                                                  56.000000
 AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000 INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
                                                0.000000E+00
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 437184.000000
 FLOOR AREA (SQFT) 40986.000000
 HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 1664120.000000
 COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) 0.000000E+00
 COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 409860.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 3167.000000
 INFILTRATION PROFILE
  .670
         .670 .670
                                 .670
                                           .670
                                                      .670
                                                                .670

    1.00
    1.00
    1.00
    1.00
    1.00

    1.00
    .670
    .670
    .670
    .670

  1.00
                                                                1.00
                                                                            1.00
 1.00
                                                                 .670
                                                                           .670
A FACTOR IN INFILTRATION EQUATION (CINA) 4.350000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 231200.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 0.000000E+00
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 47.000000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO)
                                              6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 5.900000E-01
WALL DATA

WALL NUMBER

1
2
3
4
AZIMUTH ANGLE (AZ)
.00
90.00
180.00
-90.00
WALL AREA SQFT (AWLL)
8613.0
1828.0
8541.0
1826.0
WINDOW AREA SQFT (AWND)
435.0
18.5
467.0
17.2
WINDOW HEIGHT FT (WNDH)
10.0
10.0
WINDOW WIDTH FT (WNDW)
43.5
1.9
46.7
1.7
WIDTH OF OVERHANG (WOH)
2.5
2.5
2.5
OVERHANG HGT ABV WNDW (HOH)
1.0
1.0
                                  WALL DATA
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.052	.052	.052	.052
CN FACTORS	.00165	.00165	.00165	.00165
NUMBER OF BN FACTORS (NB	5	5	5	5
N=1	.00000	.00000	.00000	.00000
N=2	00018	00018	.00000 .00018	.00018
N=2 N=3	00010	00084	00084	.00084
N=3 N=4	.00000 .00018 .00084 .00056 .00006	00056	00056	.00056
N=4 N=5	00000	00006	00006	.00006
N=5	*******	******	******	******
N=6 NUMBER OF DN FACTORS (ND)	6	6	6	6
	ь	6	0	Ü
DN FACTORS	1 00000	1 00000	1.00000	1 00000
N=1 N=2 N=3 N=4 N=5	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.00125
N=3	.83196	.83196	.83196	14500
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613 00002	.00613
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 13662				
ROOF U VALUE BTU/HR-SQFT-F (UR				
ROOF TRANS FUNCTIONS USED (1=Y			1	
ROOF C TRANSFER FUNCTION (CNR)	1.0784	09E-03		
ROOF B TRANSFER FUNCTIONS (BNR	!)			
.000 .111E-03 .561E-03	.369E-03	.369E-04	738.	
ROOF D TRANSFER FUNCTIONS (DNR				
1.00 -1.46 .533			999.	
SKYLIGHT TILT DEGREES (TILT)	0.000000	E+00		
SKYLIGHT AZIMUTH ANGLE DEGREES	(AZSK)	9999.000	000	
SKYLIGHT HEIGHT FT (SKH) 0. SKYLIGHT WIDTH FT (SKW) 0.0	000000E+00	ı		
SKYLIGHT WIDTH FT (SKW) 0.0	00000E+00			
SKYLIGHT OVERHANG WIDTH FT (SK	(WO)	00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT	FT (SKOH)	0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)	1			
SKYLIGHT SHADING COEFFICIENT ((SHSK) 0	.00000E+0	00	
SUMMER START MONTH AND DAY FOR	SHSK (MST	', NDST)	1	1
SUMMER END MONTH AND DAY FOR S	HSK (MND, N	IDND)	1	1
SKY LIGHT AREA SQFT (ASKY)				
DAYTIME SKY LIGHT U BTU/SQFT-H	IR-F (SKYU)	1.	292998	
NIGHT TIME SKYLIGHT U BTU/SQFT	-HR-F (SKY	UN)	1.292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.300000	E-01

-----INTERNAL GAINS AND PROFILES -----THERMOSTAT SET

POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	24.	47268.	31250.	25000.		
HOUR	HO	URLY FRACT	TION OF PE	AK		
1	.200	.000	1.000	1.000	72.0	.0
2	.200	.000	1.000	1.000	72.0	.0
3	.200	.000	1.000	1.000	72.0	.0
4	.200	.000	1.000	1.000	72.0	.0
5	.400	.000	1.000	1.000	72.0	.0
6	.800	.000	1.000	1.000	72.0	.0
7	1.000	.000	.600	.600	72.0	.0
8	.200	.000	.400	.400	72.0	.0

9	.200	.000	.100	.100	72.0		.0
10	.200	.000	.100	.100	72.0		.0
11	.200	.000	.100	.100	72.0		.0
12	.200	.000	.100	.100	72.0		.0
13	.200	.000	.100	.100	72.0		.0
14	.200	.000	.100	.100	72.0		. 0
15	.200	.000	.100	.100	72.0		.0
16	.200	.000	.300	.300	72.0		.0
17	.400	.300	.800	.800	72.0		.0
18	.800	.300	.800	.800	72.0		.0
19	1.000	.300	.500	.500	72.0		.0
20	1.000	.300	.500	.500	72.0		.0
21	1.000	.300	.800	.800	72.0		.0
22	.800	.000	1.000	1.000	72.0		.0
23	.200	.000	1.000	1.000	72.0		.0
24	.200	.000	1.000	1.000	72.0		.0
NO HEATI	NG ABOVE AMB	IENT TEMP	. OF (THLK	OT) 65	.000000		
	NG BELOW AMB		. OF (TCLK	OT) 100	.000000		
SYSTEM T	YPE, (IECN)		2				
	IR CFM (SACF	•					
	ER HIGH TEMP						
SYSTEM S	UPPLY AIR ST	ART TIME I	HR 0.000	0000E+00			
	UPPLY AIR STO						
	IXED AIR TEM						
	IDE AIR FRAC			0.00000	00E+00		
	CIENCY (EFAN		0000E-05				
	L PRESSURE II		• •				
	PLANT RATED						
	PLANT RATED		•				
	PLANT PART LO					400	453
.100	.191		.286	.300		.400	.451
.500	.537 .906	.600	.625	.700	.718	.800	.812
.900	.906 TYPE (ITYPCH)	1.00	1.00				
	PLANT RATED (-	1 000000	7 10		
	PLANT RATED :						
	PLANT PART LO						
10.0	16.0	20.0	22.0			40.0	34.5
50.0	42.5			70.0		80.0	71.5
	85.0						, 2.3

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	TN				
			SOLAR		D00	R			VENT	
			THRU		AND				AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDOW	INFL	LATENT
JAN	0.	GAIN	14.	0.	0.	0.	0.	0.	0.	0.
	-335.	LOSS		-26.					-326.	
FEB	0.	GAIN	16.	0.	0.	0.	0.	0.	0.	0.
	-275.	LOSS		-23.	-1.	0.	-18.	-12.	-276.	0.
MAR			21.	0.	0.	0.	0. -14.	0.	0.	0.
	-226.	LOSS		-20.	-1.	0.	-14.	-11.	-245.	0.
		~		_	_	_				
APR	0.		20.	0.	0. -1.	0.	2. -6.	0.	2.	0.
	-95.	LOSS		-12.	-1.	0.	-6.	-6.	-133.	0.
MAV	.00	CATN	22.56	0.0	.01	0.0	2 02	10	1 25	0.0
	-15.07		22.56				3.03 -1.66		1.75	.00
	-15.07	LUSS		-6.01	40	.00	-1.66	-4.05	-/1.61	.00
TIIN	.00	GAIN	23.02	0.0	.00	0.0	3.53	05	82	.00
		LOSS		-4.55			77			.00
							• • •	3.11	37.00	.00
JUL	.00	GAIN	23.12	.00	.01	.00	3.57	.13	2.28	.00
	.00	LOSS		-4.53	35	.00	95	-3.56	-61.64	.00
AUG	.00	GAIN	20.49	.00	.01	.00	2.88	.13	2.39	.00
	.00	LOSS		-4.91	35	.00	-1.13	-3.52	-59.46	.00
	.00					.00	2.06	.12	2.42	.00
	-19.36	LOSS		-6.82	38	.00	-2.17	-3.92	-72.10	.00
OCT	0.	CATN	1.0	0	^	0	•	0	2	•
OCI	-82.								-116.	0. 0.
	-02.	1055		-12.	-1.	0.	-/.	-6.	-110.	0.
NOV	0.	GAIN	13.	0.	0.	0.	0.	0.	0.	0.
	-168.			-18.			-13.			0.
DEC	0.	GAIN	12.	0.	0.	0.	0.	0.	0.	0.
	-322.	LOSS		-27.	-1.	0.	0. -24.	-13.	-311.	0.
TOT	0.		218.	0.	0.	0.	18.	1.	13.	0.
	-1538.	LOSS		-163.	-9.	0.	-113.	-89.	-1911.	0.
MAX	HEATING	LOAD=	-1058	3637.	BIOH ON	DEC 18	HOUR 2	AMB:	IENT TEM	3.
XAM	COOLING	LOAD=		υ.	BIUH ON	DEC 31	HOUR 24	AMB:	IENT TEMI	9 42.

ZONE UA BTU/HR-F 2598.4

BEACON Energy Analysis By EMC Engineers, Inc. 730RGD.I

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

NTERN	AL								FAN T	
			SPACE				LIGHTING			
MONTH			URE F MIN			CIDENT AMBT.	THOUSAND KWH	MILLION BTU		MILLION BTU
JAN	72.	72.	71.			1 57. 1 42.	7.64	5.11	.00	42.22
FEB	72.	72.		17 2			6.90	4.62	.00	38.14
MAR	72.	75.		28 3		1 63. 1 17.	7.64	5.11	.00	42.22
APR	73.	80.		30 1		1 71. 2 34.	7.39	4.95	.00	40.86
MAY	76.	86.	72.			1 70. 1 38.	7.64	5.11	.00	42.22
JUN	82.	91.	75.		21	L 76. 5 59.	7.39	4.95	.00	40.86
JUL	87.	95.	76.			L 80. 5 65.	7.64	5.11	.00	42.22
AUG	85.	91.	74.			79. 3 66.	7.64	5.11	.00	42.22
SEP	79.	91.	72.	2 15		80. 4 41.	7.39	4.95	.00	40.86
OCT	73.	83.	72.	-		L 69. 1 30.	7.64	5.11	.00	42.22
NOV	72.	76.	72.			2 67. 5 67.	7.39	4.95	.00	40.86
DEC	72.	72.	72.			1 70. 1 1.	7.64	5.11	.00	42.22
YEAR							89.95	60.18	.00	497.12

BEACON Energy Analysis By EMC Engineers, Inc.

730RGD.I

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	F HOURS WHEN	MUMIXAM N	LOADS
		INCLUDING	LOADS WE	ERE NOT MET	BT	
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	744	0	0	0	9986E+06	.0000
FEB	669	0	0	0	8767E+06	
MAR	673	0	0	_	· ·	.0000
APR		ŭ	=	0	9075E+06	.0000
	417	0	0	0	4843E+06	.0000
MAY	127	0	0	0	3032E+06	.0000
JUN	0	0	0	0	.0000	.0000
JUL	0	0	0	0	.0000	.0000
AUG	0	0	0	0	.0000	
SEP	155	0	0	_		.0000
OCT	450	•	_	0	2699E+06	.0000
		0	0	0	4422E+06	.0000
NOV	619	0	0	0	6314E+06	.0000
DEC	740	0	0	0	1059E+07	.0000
YEAR	4 594	0	0	0	1059E+07	.0000

SYSTEM TOTALS

MONTE	HEATING MILLION H BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	TION PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	539.73	.00	7.64	5.11	.00	42.22	24.2
FEB	456.30	.00	6.90	4.62	.00	38.14	24.2
MAR	408.60	.00	7.64	5.11	.00	42.22	24.2
APR	207.49	.00	7.39	4.95	.00	40.86	24.2
MAY	53.75	.00	7.64	5.11	.00	42.22	24.2
JUN	.00	.00	7.39	4.95	.00	40.86	24.2
JUL	.00	.00	7.64	5.11	.00	42.22	24.2
AUG	.00	.00	7.64	5.11	.00	42.22	24.2
SEP	65.00	.00	7.39	4.95	.00	40.86	24.2
OCT	203.75	.00	7.64	5.11	.00	42.22	24.2
NOV	338.92	.00	7.39	4.95	.00	40.86	24.2
DEC	521.64	.00	7.64	5.11	.00	42.22	24.2
YEAR	2795.18	.00	89.95	60.18	.00	497.12	24.2

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 77157. BTU/(SQFT-YEAR)

BLDG 730 - BARRACKS WITHOUT A/C - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

MONTH	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG.	TEM RIFT	HOUR!	ICS S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	9986E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	8767E+06
MAR	1922.	1254.	1.000	43.	0.	Ο.	0	0	.0000	9075E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.0000	4843E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.0000	3032E+06
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.0000	.0000
JUL	2546.	2015.	1.000	77.	0.	Ο.	0	0	.0000	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.0000	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.0000	2699E+06
OCT	1437.	953.	1.000	57.	0.	0.	0	0	.0000	4422E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.0000	6314E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	1059E+07

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORMA	TION:						
Building No: 7	30	Building Name:	Barracks w	rithout A/C			
Surveyed by: D	MS	Date:	11/9/95		Building Use:	Living Quarters	
Building Contact:					Phone No:		
Building Contact:					Phone No:		
OCCUPANCY:			-				
Number of Occupants	: Mon./Fri.:	125		Schedule:	0	То	2400
	Tues./Thurs	125			0	То	2400
	Wed.	125			0	То	2400
	Sat./Sun.	125			0	То	2400
Visitors Per Day:	Mon./Fri.:			Schedule:		То	
	Tues./Thurs					То	
	Wed.					То	
	Sat./Sun.					То	
Comments:							
LIGHTING SCHEDUL	E:						
Normal Occupancy:	MonFri.:			Schedule:	500	То	2200
	Sat./Sun.:				500	То	2200
Cleaning Crew/2nd Sh	ift: MonFri.:			Schedule:		То	
	Sat./Sun.:					То	
EQUIPMENT SCHED	ULE:						
Fan/AHU Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Chiller Schedule:	MonFri.:			Schedule:		То	
	Sat./Sun.:					То	
Boiler Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Aux. Equipment Sche	dule:						
	MonFri.:			Schedule:		То	
	Sat./Sun.:					То	
	MonFri.:			Schedule:	····	То	
	Sat./Sun.:					То	
Comments:							

E M C Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 730

Building Name: Barracks

EMC No. 1406-011

Date: 2/18/96 Prepared by: DMS

BUILDING ENVELOPE

	EXTERIOR WALLS		IST OF EXT. WALL CONSTRUCTION TYPES
Wall			
Construction		Wall Construction	
No.	Comments	No.	Description
XW-1		XW-I	Face Brick & CMU
XW-1		XW-2	Face Brick, CMU, & Gyp. Board
XW-1		XW-3	Face Brick, CMU, & Ceramic Tile
XW-1		XW-4	Face Brick, CMU, & Plaster Coat
		XW-5	Insulated Metal Panel
	WINDOWS		LIST OF WINDOW TYPES
Window			
No.	Comments	Window Construction No.	Description
W-1		W-1	Double Pane Clear
W-1		W-2	Double Pane Tinted
W-1		W-3	Single Pane with Storm Windows
W-1		W-4	Single Pane
	GENERAL: Top third of window frame is an insulated		
	metal panel.		
	POOE CONSTRUCTION		AUT OF BOOK CONSTRUCTION TURES
	COOP CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
Construction	Comments	Roof Construction	Description
			Description
R-7		R-I	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
		R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceilin Tile
		R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
		R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaste Clg.
		R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceiling Tile
		R -6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaster Clg.
		R-7	BUR, Rigid Insul., 7-1/2" Concrete Slab
	No. XW-1 XW-1 XW-1 XW-1 XW-1 W-1 W-1	Construction No. XW-1 XW-1 XW-1 XW-1 XW-1 XW-1 Window Construction No. Comments W-1 W-1 W-1 W-1 GENERAL: Top third of window frame is an insulated metal panel. ROOF CONSTRUCTION Roof Construction No. Comments Comments Comments Comments Comments Comments	Wall Construction No. Comments Wall Construction No. XW-1 XW-1 XW-2 XW-1 XW-3 XW-4 XW-1 XW-4 XW-5 XW-1 XW-5 XW-5 Window Construction No. Comments Window Construction No. W-1 W-1 W-2 W-1 W-2 W-3 W-1 GENERAL: Top third of window frame is an insulated metal panel. Roof Construction No. ROOF CONSTRUCTION Roof Construction No. Road Construction No. R-7 R-1 R-2 R-3 R-4 R-4 R-5 R-6 R-6

EMC Engineers, Inc.

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No 730

Building Name: Barracks

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INTE	RIOR EQUIP	PMENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall					
Direction (N,					
E, W, or S)	Item No.	No. of Items	Comments	Item No.	Description
,			· · · · · · · · · · · · · · · · · · ·		Architectural
				A-I	Interior Partitions
N	M-3	45		A-2	Wall Placards
N	E-3	9		A-3	Drapery Valances
N	E-2	6		A-4	Drapery Rods
N	A-5	6		A-5	Stainless Steel Shelf in Latrine
N	A-6	6	Glazed structural block 5'-0" A.F.F. in laundry	A-6	Dryer Vents
N	E-1	3			·
					Plumbing
E	M-3	6		P-I	Sinks
				P-2	Commodes
S	E-3	6	Glazed structural block 9'-0" A.F.F. in laundry	P-3	Toilet Stalls
S	M-3	45		P-4	Water Fountains
S	P-5	3		P-5	Slop Sink
W	E-2	6			HVAC Mechanical
W	M-3	3		M-1	Floor Supply/Return Grilles
				M-2	Ceiling Supply/Return Grilles
				M-3	Finned-Tube Baseboard Radiators
				M-4	Thermostats / Space Temp. Sensors
				M-5	Wall mounted convection type heater
					Electrical
				E-I	Electrical Panels
				E-2 E-3	Electrical Outlets
				E-4	Electrical Light Switches Electrican Conduit
				E-5	Emergency light
				E-6	Electrical Disconnect
					Lighting
				L-I	Wall Mounted Fixtures
				L-2	Ceiling Mounted Fixtures
				L-3	Exit Signs
<u> </u>			4.000		Fire Protection
				F-I	Alarm Pull Switches
				F-2	Alarm Sound Devices (Speakers, Bells)
				F-3	Sprinkler Heads
				F-4	Fire Extinguishes
	•				
				<u> </u>	Communication
				(-1	Telephones - Wall Mounted
				(-2	Telephones - Booth Mounted
				(-3	Telephone Jacks
				<u> </u>	

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96

CHECKED BY:

DMS AJN

FILE: 730RAD1

	PERIMETER RADIATION	SURVEY OBSERVATION	IS
RAD-1	PER RAD NO.	NORTH	LOCATION (RM)
CONV-1	SOURCE OF HEATING	NORTH	SERVES AREA

730

			UNIT TYPE			
STEAM	x	HW	ELECTRIC		<u>] </u>	
OTHER				 		
COMMENT:						

	NAMEPLATE:		
HW PUMP 1 - HP	MFG.		MODEL
HW PUMP 2 - HP	MFG.		MODEL
HW PUMP 3 - HP	MFG.		MODEL
HW PUMP 4 - HP	MFG.		MODEL
MENT: SEE CONVERTER		50.0% % AREA HEA	TING

				(PERATI	ON:					
HOURS ON:			s	М	Т	w	Т	F	s	COMMENT	
PRESENT STAR	T TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP	TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED STA	RT TIME										
REQUIRED STO	P TIME							<u> </u>		<u></u>	
MONTHS OF	V :										
J	F	М	Α	М	J	J	Α	s	0	N	D
1	1	1	1						1	1	1

		CONTROLS	3:		
	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
RADIATION CONTROL:	NONE	2-WAY VLV	3-WAY VLV	OTHER	NO CONTROL
SPACE SETPOINT (°F):	OCC HEAT	UNOCC HEAT	OCC COOL	UNOCC COOL	
RESET CONTROL (°F):	HW HIGH	HW LOW	OA LOW	OA HIGH	

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

730

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY: CHECKED BY: DMS AJN

FILE: 730RAD2

	PERIMETER RADIATION S	SURVEY OBSERVATION	IS
RAD-2	PER RAD NO.	NORTH	LOCATION (RM)
CONV-2	SOURCE OF HEATING	NORTH	SERVES AREA

			UNIT TYPE:		 	
 STEAM	x	нw	ELECTRIC	<u> </u>	 	
OTHER				 	 	· · · · · · · · · · · · · · · · · · ·
COMMENT:				 	 	

	NAMEPLATE:	
HW PUMP 1 - HP	MFG.	MODEL
HW PUMP 2 - HP	MFG.	MODEL
HW PUMP 3 - HP	MFG.	MODEL
HW PUMP 4 - HP	MFG.	MODEL
COMMENT: SEE CONVERTER		50.0% % AREA HEATING

			PERATI	ON:					
HOURS ON:	s	М	т	w T	T				
PRESENT START TIME	0	0	0				5 0	COMMENT	
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	TIMECLOCK?	
REQUIRED START TIME						2400	2400	 	
REQUIRED STOP TIME									
MONTHS ON:					L			Ĺ	
J F M	A	М	J	J	A T	s	0		
1 1 1	1					 		N	D

		CONTROLS	5 :		
	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
RADIATION CONTROL:	NONE	2-WAY VLV	3-WAY VLV	OTHER	NO CONTROL
SPACE SETPOINT (°F):	OCC HEAT	UNOCC HEAT	OCC COOL	UNOCC COOL	
RESET CONTROL (°F):	HW HIGH	HW LOW	OA LOW	OA HIGH	

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96 DMS

CHECKED BY:

AJN

BLDG:

730

FILE: **730CV1**

	BOILER & CONVERTER SURV	EY OBSERVATION	S
CV-1	BOILER/CONVERTER NO.	MER	LOCATION (RM)
C. PLANT	SOURCE OF HEATING (PLANT)	ALL	SERVES AREA

UNIT TYPE:						
	STEAM	PSIG	нw	ТЕМР.	BOILER TYPE:	
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:	
х	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:	
х	SPACE HEAT	DHW	OTHER		USE:	
ОММЕ	NT:			0%	% HTG AREA SERVED	
					BB RADIATION ONLY	

	MFG.		MODEL	936000	CAPACITY OUTPUT	(BTUH)
					CAPACITY INPUT (B)	
	MFG.		MODEL		CAPACITY OUTPUT	(BTUH)
					CAPACITY INPUT (B)	ΓUH)
0.75	HW PUMP 1 - HP	BALDOR	MFG.	JM3463		MODEL
	HW PUMP 2 - HP		MFG.			MODEL
	HW PUMP 3 - HP		MFG.			MODEL

		·			OPERAT	ION:					
HOURS (ON:		S	М	Т	w	T	F	S	COMMENT	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400		
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	ON:										
J	F	М	Α	М	J	J	Α	S	0	N	D
1	1	1	1						1	1	1

	Х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
SETPOINTS		PSIG		HW SUPPLY					
RESET CONTROL (oF):	160	HW HIGH	80	HW LOW	6 5	OA LOW	0	OA HIGH	
BURNER CONTROLS		O2 TRIM (Y/N)		OTHER					
COMMENTS:									

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG: 730 EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96 **DMS**

CHECKED BY:

AJN

730CV2 FILE:

EY OBSERVATION	NS
MER	LOCATION (RM)
ALL	SERVES AREA
	MER

			UNIT TYPE		
	STEAM	PSIG	HW	ТЕМР.	BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:
X	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:
X	SPACE HEAT	DHW	OTHER		USE:
ОММЕ	NT:			0%	% HTG AREA SERVED
					BB RADIATION ONLY

			NAMEPLATE:			
	MFG.		MODEL	936000	CAPACITY OUTPUT	(BTUH)
		-			CAPACITY INPUT (B	
	MFG.		MODEL		CAPACITY OUTPUT	(BTUH)
	г				CAPACITY INPUT (B	TUH)
0.75	HW PUMP 1 - HP	BALDOR	MFG.	JM3463		MODEL
	HW PUMP 2 - HP		MFG.			MODEL
	HW PUMP 3 - HP		MFG.			MODEL

					PERATI	ON:					
HOURS ON:			s	М	Т	w	т	F	S	COMMENT	
PRESENT START TIM	E		0	0	0	0	0	0		TIMECLOCK?	
PRESENT STOP TIME			2400	2400	2400	2400	2400	2400	2400	THEOLOGK	
REQUIRED START TI	ИE								2400		
REQUIRED STOP TIM	E									 	
MONTHS ON:			<u>-</u>							l	
J F		М	Α	м	J	J	A T	s I			т
1	1	1	1							N	D

	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
	PSIG		HW SUPPLY					
160	HW HIGH	80	HW LOW	65	OA LOW	0	OA HIGH	
	O2 TRIM (Y/N)		OTHER				OA TIIGIT	
-	160	PSIG 160 HW HIGH 02 TRIM (Y/N)	PSIG 160 HW HIGH 80	PSIG HW SUPPLY 160 HW HIGH 80 HW LOW	PSIG HW SUPPLY 160 HW HIGH 80 HW LOW 65	PSIG HW SUPPLY	PSIG HW SUPPLY 160 HW HIGH 80 HW LOW 65 OA LOW 0	PSIG HW SUPPLY 500 HW HIGH 80 HW LOW 65 OA LOW 0 OA HIGH

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY:

DMS AJN

CHECKED BY: FILE: 730EX1

AIR HANDLING UNIT SURVEY OBSERVATIONS											
EX-1	AHU NO.	MER	LOCATION (RM)								
NONE	REF. SYS. SERVING AHU	ALL	SERVES AREA								

730

		UNIT TYP	E:		
SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	H&∨	
MULTIZONE	DOUBLE DT	REHEAT	INDUCTION	VAV	
NUMBER OF ZONE	S	OTHER VE	NT FAN FOR BLDG		
COMMENT:					

	·				MFG.					MODEL
	SUPPLY FAN HP				MFG.					MODEL
20.0	RET/EXH FAN HP		CENTURY		MFG.		SC-286U-FC5-5			MODEL
0	CFM-HTG	0	CFM-CLG	0%	MIN %OA	0%	MAX %OA	0.0%	% HTG AREA	SERVED

			COILS:			
х	NONE	STM	HW	ELEC	MOD VLV	PREHEAT
x	NONE	STM	нw	ELEC	MOD VLV	HEATING
X	NONE	STM	нw	ELEC	MOD VLV	REHEAT
X	NONE	STM	нw	EVAP MEDIA	MOD VLV	HUMID.
х	NONE	DX	cw		MOD VLV	COOLING

				C	PERATI	ON:					
HOURS C	N:		S	м	Т	w	т	F	s	COMMENTS	
PRESENT S	TART TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	TOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED S	TART TIME										
REQUIRED S	STOP TIME										
MONTHS	ON:				***************************************		 			I	2
J	F	М	Α	М	J	J	A	s	0	N	D
				1	1	1	1	1			

				CONTRO	LS:				
		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK			NONE
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL		UNOCC COOL	
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	N	MAX OA (Y/N)	N	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Y	YES		NO					
COMMENTS:							<u> </u>		<u></u>

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG:

730

EMC NO.: 1406-011

DATE:

Feb-96 **DMS**

PREPARED BY: CHECKED BY:

AJN

	BLDG:	730	FILE:	730EX2							
	AIR HANDLING UNIT SURVEY OBSERVATIONS										
EX-2	AHU NO.		MER	LOCATION (RM)							
NONE	REF. SYS. SERVING AHU		ALL	SERVES AREA							

			UNIT T	YPE:		
SINGLE ZN	2-PIPE FC		4-PIPE FC	UNIT HTR	H&V	
MULTIZONE	DOUBLE DT		REHEAT	INDUCTION	VAV	
NUMBER OF ZONES	3	Х	OTHER	VENT FAN FOR BLDG		
COMMENT:			——————————————————————————————————————			

					NAMEPL	AIE:				
					MFG.					MODEL
	SUPPLY FAN HP				MFG.				*	MODEL
20.0	RET/EXH FAN HP		CENTURY		MFG.		SC-286U-FC5-5			MODEL
0	CFM-HTG	0	CFM-CLG	0%	MIN %OA	0%	MAX %OA	0.0%	% HTG AREA	1

			COILS:			
х	NONE	STM	HW	ELEC	MOD VLV	PREHEAT
х	NONE	STM	нw	ELEC	MOD VLV	HEATING
x	NONE	STM	нw	ELEC	MOD VLV	REHEAT
X	NONE	STM	нw	EVAP MEDIA	MOD VLV	HUMID.
х	NONE	DX	cw		MOD VLV	COOLING

				C	PERATI	ON:					
HOURS	ON:		s	м	Т	w	т	F	s	COMMENTS	
PRESENT	START TIME		0	0	0	0	0	0		TIMECLOCK?	
PRESENT	STOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRE	START TIME										
REQUIRED	STOP TIME										
MONTH	IS ON:									L	
J	F	М	Α	М	J	J	A	s	0	N	D
				1	1	1	1	1			

				CONTRO	LS:				
		PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT	***************************************	SETBACK	†		NONE
SPACE SETPOINT (°F):		OCC HEAT		UNOCC HEAT		OCC COOL	1	UNOCC COOL	-
OTHER SETPOINTS (°F):		HOT DECK		COLD DECK		MIXED AIR		OTHER	<u> </u>
DAMPER CONTROL:	N	MIN OA (Y/N)	N	MAX OA (Y/N)	N	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	х	YES		NO				-	

ANNUAL ENERGY SAVINGS SUMMARY FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Γ				Annual	Baseline	ECO 1 -	Peak	Baseline		Annual
ı		Baseline	ECO 1 -	Electric	Peak	Peak	Electric	Nat. Gas	ECO 1 -	Nat. Gas
ı		Annual	Annual	Energy	Electric	Electric	Demand	Energy	Annual	Energy
ı	Building	Electric	Electric	Savings	Demand	Demand	Savings	Savings	Nat. Gas	Savings
ł	No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
ſ	625	80.96	73.65	7.30	33.00	33.00	0.00	481.08	413.58	67.50

					Adjusted		Adjusted		Adjusted
:			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 625	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
631	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
650	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
658	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
732	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
740	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
750	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
753	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
822	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
825	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
838	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
842	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1008	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1009	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1022	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50
1023	6,163	6,163	1.000	7.30	7.30	0.00	0.00	67.50	67.50

^{*}Energy savings prorated on a square foot basis

ANNUAL ENERGY SAVINGS SUMMARY FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

			Annual	Baseline	ECO 2 -	Peak			Annual
	Baseline	ECO 2 -	Electric	Peak	Peak	Electric	Baseline	ECO 2 -	Nat. Gas
	Annual	Annual	Energy	Electric	Electric	Demand	Annual	Annual	Energy
Building	Electric	Electric	Savings	Demand	Demand	Savings	Nat. Gas	Nat. Gas	Savings
No.	(MBtu)	(MBtu)	(MBtu)	(kW)	(kW)	(kW)	(MBtu)	(MBtu)	(MBtu)
625	80.96	73.21	7.75	33.00	33.00	0.00	481.08	410.60	70.48

					Adjusted		Adjusted		Adjusted
			Square	Annual	Annual	Peak	Peak	Annual	Annual
			Foot	Electric	Electric	Electric	Electric	Nat. Gas	Nat. Gas
		Building	Adjust-	Energy	Energy	Demand	Demand	Energy	Energy
Building	Building	No. 625	ment	Savings	Savings*	Savings	Savings*	Savings	Savings*
No.	(SF)	(SF)	Factor	(MBtu)	(MBtu)	(kW)	(kW)	(MBtu)	(MBtu)
631	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
650	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
658	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
732	6,163	6,163	1.000	7.75	<i>7.7</i> 5	0.00	0.00	70.48	70.48
740	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
750	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
753	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
822	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
825	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
838	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
842	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1008	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1009	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1022	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48
1023	6,163	6,163	1.000	7.75	7.75	0.00	0.00	70.48	70.48

^{*}Energy savings prorated on a square foot basis

INVESTMENT COST SUMMARY

FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 1 - INSTALL 3.5 IN. FIBERGLASS BATT INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
625	\$37,132

			Square		
			Foot		·
		Building	Adjust-		Adjusted
Building	Building	No. 625	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)	Cost (\$)*
631	6,163	-	-	\$40,135	-
650	6,163	6,163	1.000	\$37,132	\$37,132
658	6,163	6,163	1.000	\$37,132	\$37,132
732	6,163	6,163	1.000	\$37,132	\$37,132
740	6,163	6,163	1.000	\$37,132	\$37,132
750	6,163	6,163	1.000	\$37,132	\$37,132
753	6,163	6,163	1.000	\$37,132	\$37,132
822	6,163	6,163	1.000	\$37,132	\$37,132
825	6,163	6,163	1.000	\$37,132	\$37,132
838	6,163	6,163	1.000	\$37,132	\$37,132
842	6,163	6,163	1.000	\$37,132	\$37,132
1008	6,163	6,163	1.000	\$37,132	\$37,132
1009	6,163	6,163	1.000	\$37,132	\$37,132
1022	6,163	6,163	1.000	\$37,132	\$37,132
1023	6,163	6,163	1.000	\$37,132	\$37,132

^{*}Investment Cost prorated on a square foot basis

INVESTMENT COST SUMMARY FOR BATTALION HQ's - BUILDINGS 625, 631, 650, 658, 732, 740, 750, 753, 822, 825, 838, 842, 1008, 1009, 1022, & 1023

ECO 2 - INSTALL 1.5 IN. RIGID INSULATION ON WALLS

REPRESENTATIVE BUILDING

Building	Investment
No.	Cost (\$)
625	\$38,019

			Square		
			Foot		
		Building	Adjust-		Adjusted
Building	Building	No. 625	ment	Investment	Investment
No.	(SF)	(SF)	Factor	Cost (\$)*	Cost (\$)*
631	6,163	-	-	\$41,014	-
650	6,163	6,163	1.000	\$38,019	\$38,019
658	6,163	6,163	1.000	\$38,019	\$38,019
732	6,163	6,163	1.000	\$38,019	\$38,019
740	6,163	6,163	1.000	\$38,019	\$38,019
<i>7</i> 50	6,163	6,163	1.000	\$38,019	\$38,019
753	6,163	6,163	1.000	\$38,019	\$38,019
822	6,163	6,163	1.000	\$38,019	\$38,019
825	6,163	6,163	1.000	\$38,019	\$38,019
838	6,163	6,163	1.000	\$38,019	\$38,019
842	6,163	6,163	1.000	\$38,019	\$38,019
1008	6,163	6,163	1.000	\$38,019	\$38,019
1009	6,163	6,163	1.000	\$38,019	\$38,019
1022	6,163	6,163	1.000	\$38,019	\$38,019
1023	6,163	6,163	1.000	\$38,019	\$38,019

^{*}Investment Cost prorated on a square foot basis

LIFE CYCLE COST ANALYSIS SUMMARY ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

			ENER	GY CONSERV	ATION INVESTMENT	PROGRAM (ECIP	•	
		LOCATION:	Fort Leonard	Wood	REGION: 2 (Missour	ri)	PROJECT NO:	1406-011
		PROJECT TITLE:	Limited Ener	gy Study, Insu	late Brick Buildings		FISCAL YEAR:	1996
		ANALYSIS DATE:	02/18/96		ECONOMIC LIFE:	20	PREPARED BY:	D. Sinz
1.	INV	ESTMENT:	BLDG 625 -	INSTALL 3.5"	FIBERGLASS BATT	INSULATION ON V	WALLS	
' '	Α.			=			\$32,860	
l	В.	SIOH COST		.0% of 1A) =			\$2,300	
l		DESIGN COST	·	.0% of 1A) =			\$1,972	
		TOTAL COST	•	+1B +1C) =			\$37,132	
	E.	SALVAGE VALUE OF	·				\$0	
	F.	PUBLIC UTILITY COM					\$0	
		TOTAL INVESTMENT		ID -1E -1F) =			>	\$37,132
2.		RGY SAVINGS (+) OF		B DISCOUNT	EACTORS:	1441.100		
	ĐΑ	TE OF NISTIR 85-3273				JAN '96	DISCOUNTED	
		ENERGY	FUEL COST	SAVINGS		DISCOUNT		
		SOURCE		MBTU/YR (2)		FACTOR (4)		
		ELECT.	\$7.33	7.30	\$53	13.80		
	B.	DIST	\$0.00	0	\$0 \$356	0.00		
		NAT GAS	\$5.30	67.50		17.76		
		COAL	\$0.00	0	\$O	0.00		
	E. F.	ELEC. DEMAND TOTAL		74.80	\$0 \$411	13.47	\$0 >	\$7,092
3.	NOI A.	N-ENERGY SAVINGS (-)				
		1 ANNUAL MAINTEN	IANCE		\$0		\$0	
		2			\$0		\$0	
		3			\$0		\$0	
		4 TOTAL ANNUAL D	ISC. SAVINGS	S (+) / COST	\$0		\$0	
	В.	NON-RECURRING (+	/-)					
		ITEM		SAVINGS (+)	YEAR OF	DISCOUNT	DISCOUNTED	
				COST(-) (1)	OCCURRENCE (2)	FACTOR (3) (TABLE A-2	SAVINGS/COST (4)	
		a. BASELINE EQUIP. F	EPLCMNT.				\$0	
		b.					\$0	
		C.					\$0	
		d.					\$0	
		e.					\$0	
		f. TOTAL		\$0			\$0	
	C.	TOTAL NON-ENERGY	DISCOUNTED	SAVINGS (+	OR COST (-)	(3A4 + 3Bf4) =		\$0
4.	FIRS	ST YEAR DOLLAR SAV	'INGS (+) / C(OSTS (-)	(;	2F3 + 3A4 + (3Bf1/	Economic Life))	\$411
		PLE PAYBACK (SPB) II			EARS TO QUALIFY)	(1G/4) =		90.30
		AL NET DISCOUNTED	· ·		·	(2F5 + 3C) =		\$7,092
		COUNTED SAVINGS-T		IT RATIO (SIR))	(6/1G) =		0.19
		(MUST HAVE SIR >	1.25 TO QUAL	JFY)				

LINGIN	にになって	ENGINEER'S OPINION OF PROBABLE COST					SHEET	-	20	,
PROJECT	1	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	eonard Wo	OM,bo			DATE PREPARED	FPARED	- 1	18 Ech 06
ENGINEER	¥.	E M C Engineers, Inc.					ESTIMATOR	OR		D. Sinz
		Denver, CO					CHECKED BY) BY	Ā.	A. Niemeyer
<u>.</u>	Itom Defor			MA	MATERIAL COS	ST		LABOR COS		
No G	Code		Unit of Measure	Ouantity	Cost	Total	Crew/	Hours/		i i
-		BUILDING 625			300	100	A A OI MCI	5	lotal	IOIAL
7		INSTALL 3.5" BATT INSULATION ON WALLS								
ω 4	13-1/21	INSTALL 3-1/2" BATT INSTITUTION	L	0						
2		ò	ν. Γ. Γ	33/0.0	\$0.18	\$611	1-CARP	0.007	\$620	\$1,231
g	MS	INSTALL 1/2 DATWALL - TAPED & SANDED	7.Y	3234.0	\$0.20	\$648	2-CARP	0.017	\$2,889	\$3,537
7	IT O	INSTALL TAIN COATS OF BAINT ON PRIXA	, r	2/28.0	\$0.24	\$643	F-2	0.009	\$1,353	\$1,996
- 00	R15WMH		S.F.	3370.0	\$0.07	\$225	1-PORD	0.01	\$813	\$1,038
σ	NE PER PER PER PER PER PER PER PER PER PE		Ë.	3.0	\$18.39	\$55	ဝှမ	5	\$1,312	\$1,367
10	S I HA	RELOCATE ELECTINICAL EXIL SIGN	Ë.	2.0	\$0.00	\$0	1-ELEC	1.5	\$91	\$91
+	REO			0.4	\$8.82	\$35	1-ELEC	0.844	\$103	\$138
12	PKB	DELOCATE VEV BOY	Ľ.	8.0	\$7.97	\$64	1-ELEC	0.896	\$218	\$282
1 6	RPDMS	AM MOVIE	EA.	1.0	\$0.00	\$0	1-CARP	0.65	\$17	\$17
14	RT	RELOCATE TELEDUONE JACK	J.Y.	1.0	\$0.00	\$0	2-CARP	1.5	828	\$79
- 12	S T S	RELOCATE TOIL ET STALL	ا ا ک	2.0	\$20.03	\$40	1-ELEC	0.333	\$20	\$60
2 4	DIAMATE	DEI OCATE WALL MOUNTERS TELEN COLOR	Ę.	2.0	\$0.00	\$0	2-CARP	3.536	\$372	\$372
17	DIVID	DELOCATE WALL MOUNIED IELEVISION SET	Е	3.0	\$28.72	\$86	L-2	3.42	\$476	\$562
- 62	SWS	RELOCATE WOOD SHELD	Ľ.	2.0	\$25.05	\$50	ج 1-	4.546	\$512	\$562
0	PWTC	DELOCATE WOOD SHELF	 	2.0	\$1.22	\$2	1-CARP	0.12	\$6	\$3
2 2	RAT	1000	EA.	2.0	\$35.83	\$72	Ø-2	10.904	\$1,911	\$1,983
2	R24WMH	RELOCATE CELLING LILE - 4-0 FROM WALL		328.0	\$1.14	\$375	1-CARP	0.134	\$1,155	\$1,530
22	R12WMH	RELOCATE 12' BASEBOARD BABIATION	i E	2.0	\$18.39	\$37	ဗ္-ဇ	5.68	\$994	\$1,030
3	REWAIH	RELOCATE & BASEBOARD BADIATION	- E	2.0	\$18.39	\$37	ဝှမ	5.25	\$918	\$955
24	1	INSTALL 1/2" MATERDER DEN TABER 9 CASIGE	EA.	3.0	\$18.39	\$55	9-0	4.68	\$1,228	\$1,283
25		INSTALL CERAMIC TILE 4-1/4" > 4 -1/4" TILE	V. C.	136.0	\$0.84	\$114	2-CARP	0.02	\$143	\$257
26		RELOCATE DRAPERIES WINDOW SHADES	ران الم	30.0	\$1.83	\$249	2-TILE	0.084	\$553	\$802
27		SUBTOTAL	5	20.0 	90.00	0.00	L-2	0.744	\$1,243	\$1,243
28	DIFF	DIFFICILITY EACTOR				\$3,399			\$17,027	\$20,426
29		SIBTOTAL	-		2%				\$851	\$851
33	Ę					\$3,399			\$17,878	\$21,277
3 8		GVENTEAU			17%	\$278			\$3,039	\$3,617
	000	SUBJUINE			:	\$3,977			\$20,917	\$24,894
33		PKOFII			10%	\$398			\$2,092	\$2,489
3 8	1	SOURCE				\$4,374			\$23,009	\$27,383
ب بر	_{5	CONTINGENCY			20%	\$875			\$4,602	\$5,477
3	10171					\$5,249			\$27,611	\$32,860

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) PROJECT NO: 1406-011 REGION: 2 (Missouri) Fort Leonard Wood LOCATION: FISCAL YEAR: 1996 Limited Energy Study, Insulate Brick Buildings PROJECT TITLE: D. Sinz PREPARED BY: **ECONOMIC LIFE:** 20 02/18/96 ANALYSIS DATE: BLDG 625 - INSTALL 1.5" RIGID INSULATION ON WALLS 1. INVESTMENT: \$33,645 A. CONSTRUCTION COST \$2,355 (7.0% of 1A) =B. SIOH COST \$2,019 (6.0% of 1A) =C. DESIGN COST \$38,019 (1A + 1B + 1C) =D. TOTAL COST \$0 E. SALVAGE VALUE OF EXISTING EQUIPMENT = \$0 F. PUBLIC UTILITY COMPANY REBATE = \$38,019 ----> (1D - 1E - 1F) =G. TOTAL INVESTMENT 2. ENERGY SAVINGS (+) OR COST (-): DATE OF NISTIR 85-3273-10 USED FOR DISCOUNT FACTORS: JAN '96 DISCOUNTED DISCOUNT **FUEL COST SAVINGS** ANNUAL \$ **ENERGY** SAVINGS (5) FACTOR (4) \$/MBTU (1) MBTU/YR (2) SAVINGS (3) SOURCE \$783 7.75 \$57 13.80 \$7.33 A. ELECT. ŝO 0.00 \$0 \$0.00 0 DIST B. \$6,634 17.76 \$374 70.48 \$5.30 C. NAT GAS \$0 0.00 0 \$0 \$0.00 D. COAL 13.47 \$0 \$0 E. ELEC. DEMAND \$7,418 ----> \$430 F. TOTAL 78.23 3. NON-ENERGY SAVINGS (+) OR COST (-) A. ANNUAL RECURRING (+/-) \$0 0.00 \$0 1 ANNUAL MAINTENANCE \$0 0.00 \$0 2 0.00 \$0 \$0 \$0 4 TOTAL ANNUAL DISC. SAVINGS (+) / COST \$0 NON-RECURRING (+/-) DISCOUNTED YEAR OF DISCOUNT SAVINGS (+) **ITEM** FACTOR (3) SAVINGS/COST (4) COST(-) (1) OCCURRENCE (2) (TABLE A-2) \$0 a. BASELINE EQUIP. REPLCMNT. \$0 b. \$0 c. \$0 d. \$0 \$0 f. TOTAL \$0 TOTAL NON-ENERGY DISCOUNTED SAVINGS (+) OR COST (-) (3A4 + 3Bf4) =\$430 (2F3 + 3A4 + (3Bf1/Economic Life)) 4. FIRST YEAR DOLLAR SAVINGS (+) / COSTS (-) 88.35 (1G/4) =5. SIMPLE PAYBACK (SPB) IN YEARS (MUST BE < 10 YEARS TO QUALIFY) \$7,418 (2F5 + 3C) =6. TOTAL NET DISCOUNTED SAVINGS 0.20 (6/1G) =7. DISCOUNTED SAVINGS-TO-INVESTMENT RATIO (SIR)

LIFE CYCLE COST ANALYSIS SUMMARY

(MUST HAVE SIR > 1.25 TO QUALIFY)

ENCINI	בבסים סנ	ENGINEED'S ODINION OF PROBABI F COST					SHEET	-	PF	1
	ברוץ ס ס.	Limited Energy Study Insulate Brick Buildings, Fort Leonard Wood, MO	onard Woo	d, MO			DATE PREPARED	PARED	18-F	18-Feb-96
FNGINFFR	_ ~	F M C Engineers. Inc.					ESTIMATOR	Ğ.	D.	Sinz
	•	Denver, CO					СНЕСКЕВ ВУ	ВУ	A. Nik	A. Niemeyer
				MA	MATERIAL COST	Ţ	בו	LABOR COST		
Line	Item Refer	Item Description	Unit of Measure	Quantity	Unit Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-		BUILDING 625								
2		INSTALL 1.5" RIGID INSULATION ON WALLS								
3								000	100	60 700
4	11-1/2RI	INSTALL 1-1/2" RIGID INSULATION	S.F.	3370.0	\$0.59	\$1,993	1-CARP	0.008	80/\$	\$2,702
2	0	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3234.0	\$0.20	\$648	2-CARP	0.017	\$2,889	43,537
9	IFS	INSTALL 3/4"x2" FURRING STRIPS	LF.	1734.0	\$0.19	\$331	1-CARP	0.016	\$729	41,000
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3370.0	\$0.07	\$225	1-PORD	0.01	\$813	\$1,038
ω	R15WMH	RELOCATE 15' BASEBOARD RADIATION	EA.	3.0	\$18.39	\$55	9		\$1,312	\$1,367
0	REES	_	Ë	2.0	\$0.00	\$0	1-ELEC	1.5	\$91	163
9	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	EA.	4.0	\$8.82	\$35	1-ELEC	0.844	\$103	\$138
-	REO	RELOCATE ELECTRICAL OUTLET	EA.	8.0	\$7.97	\$64	1-ELEC	0.896	\$218	\$287
12	RKB	RELOCATE KEY BOX	EA.	1.0	\$0.00	\$0	1-CARP	0.65	\$17	\$17
1 6	RPDMS	RELOCATE PULL DOWN MOVIE SCREEN	S.F.	1.0	\$0.00	\$0	2-CARP	1.5	\$29	879
14	RTJ	RELOCATE TELEPHONE JACK	EA.	2.0	\$20.03	\$40	1-ELEC	0.333	\$20	\$60
7.	RTS	RFLOCATE TOILET STALL	EA.	2.0	\$0.00	\$0	2-CARP	3.536	\$372	\$372
9	RWMTS	RELOCATE WALL MOUNTED TELEVISION SET	EA.	3.0	\$28.72	\$86	L-2	3.42	\$476	\$562
17	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EĄ.	2.0	\$25.05	\$20	ģ	4.546	\$512	\$562
- 8	RWS	RELOCATE WOOD SHELF	L.F.	2.0	\$1.22	\$2	1-CARP	0.12	93	6\$
19	RWTC	RELOCATE WATER CLOSET	EA.	2.0	\$35.83	\$72	_	10.904	\$1,911	\$1,983
20	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	<u>.</u> ت	328.0	\$1.14	\$375	+	0.134	\$1,155	\$1,530
21	R24WMH	1	EA.	2.0	\$18.39	\$37	ဝှမ	5.68	\$994	\$1,030
22	R12WMH		ĘĄ.	2.0	\$18.39	\$37		5.25	\$918	CC6\$
23	R6WMH		ËĄ.	3.0	\$18.39	\$55	_	4.68	\$1,228	\$1,283
24	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDE	S.F.	136.0	\$0.84	\$114	(4)	0.02	\$143	/97\$
25	ICT	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	136.0	\$1.83	\$249	7	0.084	\$553	2084
26	RDR	RELOCATE DRAPERIES, WINDOW SHADES	EĄ.	36.0	\$0.00	\$	L-2	0.744	\$1,243	\$7,243
27		SUBTOTAL				\$4,469			\$10,491	\$20,901
28	DIFF	DIFFICULTLY FACTOR			%5				CZ84	C70¢
29		SUBTOTAL				\$4,469			\$17,316	\$21,785
30	F	OVERHEAD	1		17%	\$760			\$2,944	\$3,703
3		SUBTOTAL				\$5,229			\$20,259	\$25,489
32	Oad	PROFIT		A 400 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100 - 100	10%	\$523			\$2,026	\$2,549
3, 8	2	SUBTOTAL							\$22,285	\$28,037
25	TNOO	CONTINCA			20%	\$1,150			\$4,457	\$5,607
35	TOTALOT	TSO				\$6,902			\$26,742	\$33,645
<u>, </u>										

三 ラスコ	ロアドラ	ENGINEER'S OPINION OF PROBABLE COST					SHEEL	_	<u> </u>	_
PROJECT		Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood,MO	onard Wook	OM,E			DATE PREPARED	EPARED	18-	18-Feb-96
ENGINEER	æ	E M C Engineers, Inc.					ESTIMATOR	JR	Ö.	D. Sinz
		Denver, CO					СНЕСКЕР ВУ) ВҮ	A. N	A. Niemeyer
	1		:	MA	MATERIAL COS	ST	1-1	ABOR COST		
So.	Item Refer Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-										
2		INSTALL 3.5" BATT INSULATION ON WALLS								
,	4.0		L	0 0100	0,00	100	200	1000	0004	
4	13-1/21	÷ .	S.F.	3370.0	\$0.18	\$611	1-CARP	0.007	\$620	\$1,231
2	0	INSTALL 1/2" DRYWALL - TAPED & SANDED	S.F.	3234.0	\$0.20	2648	2-CARP	0.017	\$2,889	\$3,537
9	MSI	INSTALL 2"x4" STUDDED WALL 2" OC	֡֞֜֝֟֝֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓֓	2728.0	\$0.24	\$643	F-2	0.009	\$1,353	\$1,996
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWALL	S.F.	3370.0	\$0.07	\$225	1-PORD	0.01	\$813	\$1,038
∞	R15WMH	RELOCATE 15' BASEBOARD RADIATION	ď	3.0	\$18.39	\$55	90	2	\$1,312	\$1,367
တ	REES	RELOCATE ELECTRICAL EXIT SIGN	E.	3.0	\$0.00	Q	1-ELEC	1.5	\$137	\$137
9	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	Ą	5.0	\$8.82	\$44	1-ELEC	0.844	\$128	\$173
Ξ	REO	RELOCATE ELECTRICAL OUTLET	EĄ.	9.0	\$7.97	\$72	1-ELEC	0.896	\$245	\$317
12	RKB	RELOCATE KEY BOX	Ē	1.0	\$0.00	\$0	1-CARP	0.65	\$17	\$17
13	RTJ	RELOCATE TELEPHONE JACK	EĄ.	2.0	\$20.03	\$40	1-ELEC	0.333	\$20	\$60
14	RTS	RELOCATE TOILET STALL	EĀ.	2.0	\$0.00	\$0	2-CARP	3.536	\$372	\$372
15	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	EA.	2.0	\$25.05	\$20	<u>9</u>	4.546	\$512	\$562
16	RWS	RELOCATE WOOD SHELF	H.	2.0	\$1.22	\$2	1-CARP	0.12	\$6	\$
17	RWTC	RELOCATE WATER CLOSET	EA.	2.0	\$35.83	\$72	Q-2	10.904	\$1,911	\$1,983
18	RAT		Ä.	328.0	\$1.14	\$375	1-CARP	0.134	\$1,155	\$1,530
19	R24WMH		Œ.	2.0	\$18.39	\$37	9	5.68	\$994	\$1,030
20	R12WMH		EA.	2.0	\$18.39	\$37	<u>ဂ</u>	5.25	\$918	\$955
21	REWIMH	RELOCATE 6' BASEBOARD RADIATION	EA.	3.0	\$18.39	\$55	9	4.68	\$1,228	\$1,283
22	IWB-1/2	INSTALL 1/2" WATERPRF BRD - TAPED & SANDED	S.F.	136.0	\$0.84	\$114	111	0.02	\$143	\$257
23	ᄗ	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	136.0	\$1.83	\$249		0.084	\$553	\$802
24	RFAPB	RELOCATE FIRE ALARM PULL BOX	Ē	2.0	\$0.00	\$		1.6	\$97	26\$
22	RFE	RELOCATE FIRE EXTINGUISHER	Ë	2.0	\$0.00	တ္တ		0.2	\$11	\$11
56	REP	RELOCATE ELECTRICAL PANEL	Ę	1.0	\$0.00	S		12.191	\$371	\$371
27	REDS	RELOCATE ELECTRIC DISCONNECT SWITCH	Ē	2.0	\$0.00	\$	<u>+</u>	5.2	\$317	\$317
78	RFSS	RELOCATE FIRE SUPPRESSION SYSTEM	Ę	2.0	\$0.00	\$	o-2	16	\$2,804	\$2,804
23	RDR	RELOCATE DRAPERIES, WINDOW SHADES	Ä	30.0	\$0.00	\$	L-2	0.744	\$1,036	\$1,036
ଛ		SUBTOTAL				\$3,329			\$19,963	\$23,293
31	H	DIFFICULTLY FACTOR			2%				\$998	\$66\$
32		SUBTOTAL				\$3,329			\$20,961	\$24,291
33	H	OVERHEAD			17%	\$566			\$3,563	\$4,129
34		SUBTOTAL				\$3,895			\$24,525	\$28,420
35	PRO	PROFIT			10%	\$390			\$2,452	\$2,842
36		SUBTOTAL				\$4,285			\$26,977	\$31,262
37	CONT	CONTINGENCY			20%	\$857			\$5,395	\$6,252
38	TOTAL COST	180	i			\$5,142			\$32,372	\$37,514
33	SIOH COST				%9	\$309			\$1,942	\$2,251
40	DESIGN COST	ST			%9	\$309			\$1,942	\$2,251
41	TOTAL IN	TOTAL INVESTMENT				\$2'2\$			\$36,257	\$42,016

							SHEET	,	P	-
PROJECT	72	Limited Energy Study, Insulate Brick Buildings, Fort Leonard Wood, MO	onard Woo	d, MO			DATE PREPARED	EPARED	18-	18-Feb-96
ENGINEER	ER	E M C Engineers, Inc.					ESTIMATOR	OR	٥	D. Sinz
		Denver, CO					СНЕСКЕВ ВУ	ЭВУ	A.N	A. Niemeyer
				MA	MATERIAL COS	ST		LABOR COST	ĭ	
S e	Code	Item Description	Unit of Measure	Quantity	Cost	Total	Crew/ Worker	Hours/ Unit	Total	TOTAL
-		BUILDING 631								3
2 6		INSTALL 1.5" RIGID INSULATION ON WALLS								
4	11-1/2RI	INSTALL 1-1/2" RIGID INSUI ATION	A C	3370.0	€0 50	£1 003	4 6400	000	6200	100
5	פ	INSTALL 1/2" DRYWALL TAPED & SANDED	U	32340	\$0.09	01,990	_	0.008	\$708	\$2,702
9	FS			1724.0	\$0.20	9040	7 CARP	0.017	\$2,889	\$3,537
7	ITCP	INSTALL TWO COATS OF PAINT ON DRYWAIT	ט ני	3370.0	\$0.13	\$33 \$228		0.016	\$729	\$1,060
80	R15WMH	RELOCATE 15' BASEBOARD RADIATION	F A	30.0	\$18.30	#243 #54		0.0	40.5	91,030
6	REES	RELOCATE ELECTRICAL EXIT SIGN	i ∆	3.0	\$0.00	G.	1 H	2 4	\$127	4137
10	RELS	RELOCATE ELECTRICAL LIGHT SWITCH	Ę	5.0	\$8.82	\$44	1-ELEC	0.844	\$128	\$173
=	REO	RELOCATE ELECTRICAL OUTLET	Ā	9.0	\$7.97	\$72	1-ELEC	0.896	\$245	\$317
12	RKB	RELOCATE KEY BOX	Ā	1.0	\$0.00	\$0	1-CARP	0.65	\$17	\$17
5	RTJ	RELOCATE TELEPHONE JACK	Ą.	2.0	\$20.03	\$40	1-ELEC	0.333	\$20	\$60
4	RTS	RELOCATE TOILET STALL	Ā	2.0	\$0.00	\$	2-CARP	3.536	\$372	\$372
15	RWP	RELOCATE 1/2" HW & CW DOMESTIC PIPING	Ā	2.0	\$25.05	\$50	Ģ	4.546	\$512	\$562
9 ;	RWS	RELOCATE WOOD SHELF	H.	2.0	\$1.22	\$2	1-CARP	0.12	\$6	6\$
14	RWTC		Ä	2.0	\$35.83	\$72	0-2	10.904	\$1,911	\$1,983
18	RAT	RELOCATE CEILING TILE - 4'-0" FROM WALL	Ë.	328.0	\$1.14	\$375	1-CARP	0.134	\$1,155	\$1,530
19	R24WMH	RELOCATE 24' BASEBOARD RADIATION	EA.	2.0	\$18.39	\$37	9-0	5.68	\$994	\$1,030
2	R12WMH	RELOCATE 12' BASEBOARD RADIATION	Ę	2.0	\$18.39	\$37	9-0	5.25	\$918	\$955
27	REWMH	RELOCATE 6' BASEBOARD RADIATION	EA.	3.0	\$18.39	\$55	9-0	4.68	\$1,228	\$1,283
22	IWB-1/2		S.F.	136.0	\$0.84	\$114	2-CARP	0.02	\$143	\$257
2	5	INSTALL CERAMIC TILE, 4-1/4" x 4-1/4" TILE	S.F.	136.0	\$1.83	\$249	2-TILE	0.084	\$553	\$802
47	KHAPB	RELOCATE FIRE ALARM PULL BOX	Œ.	2.0	\$0.00	\$	1-ELEC	1.6	26\$	\$97
26	D T G	RELUCATE FIRE EXTINGUISHER	E E	2.0	\$0.00	<u>چ</u>	1-CARP	0.2	\$11	\$11
27	PENG	DEI OCATE ELECTRICAL PANEL	5.6	0.0	\$0.00	G	1-ELEC	12.191	\$371	\$371
2 %	RESS	RELOCATE ELECTRIC DISCONNECT SWITCH	5 €	7.0	\$0.00	တ္ဆ	1-ELEC	5.2	\$317	\$317
29	RDR	RELOCATE DRADEDIES WINDOW STATES	5 5	0.2	\$0.00	3	7-5	16	\$2,804	\$2,804
30		SUBTOTAL	5	- 0.0c	\$0.00	0	L-2	0./44	\$1,036	\$1,036
31	DIFF	DIFFICULTLY FACTOR			70%	004,46			4709	\$23,827
32		SUBTOTAL			8	\$4.400			420 300	1766
33	ЭН	OVERHEAD			17%	\$748			\$3.468	\$4.1.33 \$4.716
34		SUBTOTAL				\$5.148	-		\$23.867	\$29,015
35	PRO	PROFIT			10%	\$515			\$2,387	\$2.901
99		SUBTOTAL				\$5,663			\$26,253	\$31,916
37	CONT	CONTINGENCY			20%	\$1,133			\$5.251	\$6,383
38	TOTAL COST	ST			-	\$6,795			\$31,504	\$38,299
68	SIOH COST				%9	\$408			\$1,890	\$2,298
€	DESIGN COST	19			%9	\$408			\$1,890	\$2,298
7	JOI AL INV	COLMENI				\$7,611			\$35,284	\$42,895

E M C ENGINEERS, I	NC					DATE:	Feb-96
·		DICK BINIT	NINCE			BY:	
PROJECT: LIMITED ENERGY ST	•	RICK BUILL	JINGS			•	
CLIENT CONTRACT NO.: DACA	01-94D-0033					JOB:	1406.011
LOCATION: FT LEONARD WOO	D, MO.					CHK:	AJI
						FILE:	625BH
DI III IN	NG HEATING L	OAD C	A I CHU A .	TION CHEE	т		
BUILDI	NG HEATING L	OAD C	ALCULA	IION SHEE			
BLDG NO: 625		BATTALIC					
BLDG FUNCTION:	ADMINISTRATIO	N AND CLA	ASSHOOMS	<u> </u>		# FLOORS	1
FLOOR AREA: (SQ. FT) SLAB PERIMETER: (FT)	5,795 312					# 1 LOONS	· · · · ·
JEAD FEITHEFEIT. (17)							
I. AREAS: ([] FIELD VERIFIED	ELEVATION PLANS			FACT	WEST	TOTAL	
WALLS CROSS	(SQ. FT)	1,303	1,135	EAST 587	WEST 981	TOTAL 4,006	
WALLS, GROSS GLASS	(SQ. FT)	1,303	1,135	105	90	510	
PERSONNEL DOOR	(SQ. FT)	84	0	0	42	126	
INSULATED PANEL	(SQ. FT)	117	68	58	234	477	
WALLS, NET	(SQ. FT)	922	932	424	615	2,893	
ROOF AREA (OR CEILING AREA				1 0000	(SQ. FT)	5,795	
INSULATED PANEL BASEMENT WALLS	(SQ. FT) (SQ. FT)	4//	PERSONNE	L DOOR 0	(SQ. FT)	126	
II. CONSTRUCTION: ([] FIELD WALLS: (SKETCH CROSS SECT	VERIFIED WALL, F	OOF, WIN	DOW, DOO		OMPONEN	TS I	R-VALUE
WALLS: (SKETCH CHOSS SEC	TION OF WALL				OUTSIDE		0.17
					4" FACE I		0.43
					AIR SPAC	E	0.91
					6" CMU		1.89
				5. 6.			
					INSIDE AI	R FILM	0.68
						R-WALL =	4.08
						U = 1/R	0.245
ROOF: (SKETCH CROSS SECTI	ON OF ROOF)				OMPONEN OUTSIDE		R-VALUE 0.17
					BUILT UP		0.17
					1" RIGID I		4.00
				4.	AIR SPAC	E	0.91
				_	6" FG BA		19.00
					ACOUSTI INSIDE AI		1.35 0.68
				/.		R-ROOF =	26.45
					1017.21	U = 1/R	0.038
GLASS TYPE:	PPG 'PENNVERN	ON' C.L. T	WNDV, SS	A, .88 S.C.		R-GLASS	1.61
SLAB TYPE FLOOR:	CONCRETE					SLF R-BASEM.	0.83
BASEMENT TYPE: INSULATED PANEL:	NONE					R-BASEM.	4.20
PERSONNEL DOOR TYPE:	METAL					R-PDOOR	2.56
III. INFILTRATION:							
TIGHT WALL H/M/L (SQ.FT.)			X CFM /	SQ.FT.	0.000	=	0
	L	4006	X CFM /		0.092	=	369
AVG. WALL H/M/L (SQ.FT.)			Y CEM /	SQ.FT.	0.000	=	0
LEAKY WALL H/M/L (SQ.FT.)							
AVG. WALL H/M/L (SQ.FT.) LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE		20	X CFM /	OPENING /HR	1.600	=	32
LEAKY WALL H/M/L (SQ.FT.)		20 25	X CFM /	OPENING /HR	1.600 1.385	=	35
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE	E DOORS	25	X CFM /0 X CFM /0 TOTAL INF	OPENING /HR ILTRATION (C	1.600 1.385 FM)	=	35 435
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBL UA PANEL	PANEL AREA	25 477	X CFM /0 X CFM /0 TOTAL INF	OPENING /HR ILTRATION (C X PANEL "U"	1.600 1.385 FM) 0.238	= = =	35 435 114
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBL UA PANEL UA PDOOR	PANEL AREA PDOOR AREA	477 126	X CFM /0 X CFM /0 TOTAL INF	OPENING /HR ILTRATION (C X PANEL "U" X DOOR "U"	1.600 1.385 FM) 0.238 0.391	= = = =	35 435 114 49
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBL UA PANEL UA PDOOR UA WALL	PANEL AREA PDOOR AREA WALL AREA	25 477 126 2,893	X CFM /0 X CFM /0 TOTAL INF	OPENING /HR FILTRATION (C X PANEL "U" X DOOR "U" X WALL "U"	1.600 1.385 FM) 0.238 0.391 0.245	= = = = =	35 435 114 49 709
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBL UA PANEL UA PDOOR UA WALL UA ROOF	PANEL AREA PDOOR AREA WALL AREA ROOF AREA	477 126 2,893 5,795	X CFM // X CFM // TOTAL INF	OPENING /HR ILTRATION (C X PANEL "U" X DOOR "U" X WALL "U" X ROOF "U"	1.600 1.385 FM) 0.238 0.391 0.245 0.038	= = = =	35 435 114 49
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBL UA PANEL UA PDOOR UA WALL UA ROOF UA GLASS	PANEL AREA PDOOR AREA WALL AREA	25 477 126 2,893	X CFM // X CFM // TOTAL INF	OPENING /HR FILTRATION (C X PANEL "U" X DOOR "U" X WALL "U"	1.600 1.385 FM) 0.238 0.391 0.245	= = = = = = =	35 435 114 45 709 215
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBL UA PANEL UA PDOOR UA WALL UA ROOF	PANEL AREA PDOOR AREA WALL AREA ROOF AREA GLASS AREA	25 477 126 2,893 5,795 510	X CFM // X CFM // TOTAL INF	OPENING /HR ILTRATION (C X PANEL "U" X DOOR "U" X WALL "U" X ROOF "U" X GLASS "U"	1.600 1.385 FM) 0.238 0.391 0.245 0.038 0.621	= = = = = = = =	35 435 114 49 709 219 317
LEAKY WALL H/M/L (SQ.FT.) DOOR OPENINGS / HR - SINGLE DOOR OPENINGS / HR - DOUBL UA PANEL UA PDOOR UA WALL UA ROOF UA GLASS UA SLAB	PANEL AREA PDOOR AREA WALL AREA ROOF AREA GLASS AREA SLAB PERIM.	477 126 2,893 5,795 510 312	X CFM // X CFM // TOTAL INF	OPENING /HR ILTRATION (C X PANEL "U" X DOOR "U" X WALL "U" X ROOF "U" X GLASS "U" X SLF	1.600 1.385 FM) 0.238 0.391 0.245 0.038 0.621 0.830	= = = = = = = = = =	35 435 114 49 709 219 317 259

E M C Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE:

26-Jan-96 DMS

PREPARED BY: CHECKED BY:

AJN

FILE: BLDG: 625Z1.XLS **625**

ZONE:

	Rates	of H	leat Gain from Occupants of Co	nditioned Spaces				
Zone No.	No. of People	Activ. Type	Degree of Activity	Typical Application	Sensible (BTU/H)	Latent (BTU/H)	TOT Sen. (BTU/H)	TOT. Lat. (BTU/H)
1	50	2	Seated very light work (writing)	Offices, hotels, apts	245	155	12,250	7,750
TOTAL	50					TOTAL	12,250	7,750

			Peak Wattage Value for Lights		
Zone No.	No. of Fixtures	Fixture Type	Description	Watts/ Fixture	Total Wattage
1	42	8	Fluorescent, 4 - 34w lamps, 2 - 16w ballasts (2x4 ft. fix.)	168	7,056
	35	6	Fluorescent, 2 - 34w lamps, 16w ballast (2x4 ft. fixture)	84	2,940
	15	18	Incandescent - 60w	60	900
TOTAL	92			TOTAL	10,896

			Peak Value for Internal Gains)			
Zone No.	No. of Equip.	Equip. Type	Description	Average Wattage	Heat Gain to Space(%)	Total Wattage	Total (BTU)
1	6	62	Television (Color, tube)	300	15%	1,800	6,143
	1	48	Paper Shredder	1,625	20%	1,625	5,546
1 [6	5	Printer (laser)	870	34%	5,220	17,816
i [3	12	Typewriter	100	10%	300	1,024
	1		Coffee Maker	1,500	30%	1,500	5,120
	1	10	Copiers (Large)	1,570	20%	1,570	5,358
	1	25	Cold Food/Beverage	1,535	50%	1,535	1,535
	9	3	Microcomputer	350	91%	3,150	10,751
				TOTAL	41%	16,700	53,293

EMC Engineers, Inc.

PROJECT: LIMITED ENERGY STUDY, INSULATING BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA01-94-D-0033 LOCATION: FORT LEONARD WOOD, MO

EMC NO.:

1406-011

DATE: 26-Jan-96
PREPARED BY: DMS
CHECKED BY: AJN

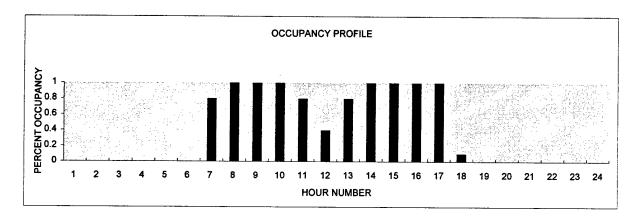
FILE:

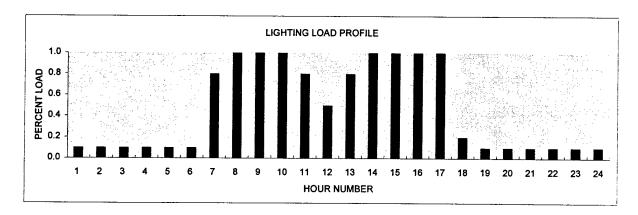
625Z1.XLS

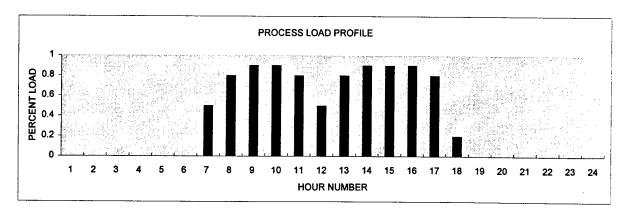
BLDG: ZONE:

625

BLD	BLDG	TYPE OF											HOU	R NU	MBER		'									
TYPE	FUNCTION	PROFILE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
3	Administration	OCCUPANCY	0	0	0	0	0	٥	0.8	1	1	1	0.8	0.4	0.8	1	1	1	1	0.1	0	0	ō	0	0	0
		LIGHTING	0.1	0.1	0.1	0.1	0.1	0.1	0.8	1	1	1	0.8	0.5	0.8	1	1	1	1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
		PROCESS	0	0	0	0	0	0	0.5	0.8	0.9	0.9	0.8	0.5	0.8	0.9	0.9	0.9	0.8	0.2	0	0	0	0	0	0







```
BLDG 625 - BATTALION HQ BASELINE
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
                            1.000000
SKY CLEARNESS FACTOR (CLN)
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA -----
******REAL WEATHER FROM DISK******
FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000

MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000

AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                              70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS)
                                             9.00000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
                             .850
                                                .850
.850 .850 .850
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                                                                    1.00

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1.00
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                                                                    1.00
1.00
                                                           .850
                                                                     .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG)
                            30
DAY TIME WINDOW U BTU/HR-SOFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
```

	WALL DAT	'A		
WALL NUMBER	1	2	3	4
AZIMUTH ANGLE (AZ)	.00	90.00	180.00	-90.00
WALL AREA SQFT (AWLL)	1000.0	849.0	1039.0	482.0
WINDOW AREA SQFT (AWND)	135.0	90.0	180.0	105.0
WINDOW HEIGHT FT (WNDH)	10.0	10.0	10.0	10.0
WINDOW WIDTH FT (WNDW)	13.5	9.0	18.0	10.5
WIDTH OF OVERHANG (WOH)	.0	.0	.0	.0
OVERHANG HGT ABV WNDW (HOH)	.0	· . 0	.0	.0

MAX SOLAR WITH NO SHADE (SOLMX)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW) WALL TRANSFER FUNCTIONS	.245	.243	.244	.244
	01025	01000	.01829	24.000
NUMBER OF BN FACTORS (NB	.01837		.01829	
BN FACTORS BN (BN)	5	5	5	5
	00003	00003	00003	00003
N=2	.00003	.00003	.00003 .00281 .01012 .00496 .00036	.00003
N=3	.00283	.00280	.00281	.00281
N=3 N=4	.01017	.01008	.01012	.01012
N=5	.00498	.00494	.00496	.00496
N=6	.0003/	.00036	.00036	.00036
NUMBER OF DN FACTORS (ND)	******	*****	*****	******
DN FACTORS	5	5	5	5
	1 00000	1 00000	1.00000	1 00000
N=2	-1 50943	_1 50000	1.00000	1.00000
	-1.50943 65654	-1.50943	-1.50943	-1.50943
N=4	- 07415	- 07/15	- 07415	.03034
N=5	00212	00212	07415	07415
N=6	******	.00212	.65654 07415 .00212 *****	.00212
ROOF AREA SQFT (AROF) 5795	000000			
ROOF U VALUE BTU/HR-SQFT-F (UR		0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y	FS 0-NO)	(IDOOE-02	1	
ROOF C TRANSFER FUNCTION (CNR)			1	
ROOF B TRANSFER FUNCTIONS (BNR		701-04		
.000 .186E-05 .279E-04	,	689F_04	1300-04	
ROOF D TRANSFER FUNCTIONS (DNR		.0051 04	.1305-04	
1.00 -1.97 1.36	•	534E-01	- 250E-02	
SKYLIGHT TILT DEGREES (TILT)			.2301 02	
SKYLIGHT AZIMUTH ANGLE DEGREES			000	
SKYLIGHT HEIGHT FT (SKH) 0.				
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SK		00000E+00		
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	00E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (
SUMMER START MONTH AND DAY FOR				1
SUMMER END MONTH AND DAY FOR S	HSK (MIND, N	DND)	1	1
SKY LIGHT AREA SQFT (ASKY)	0.00000E+	00		
DAYTIME SKY LIGHT U BTU/SQFT-HINIGHT TIME SKYLIGHT U BTU/SQFT	R-F (SKYU)	1.	292998	
FRACTION OF PROCESS HEAT TO IN	TERNAL SPA	CE (FAP)	4.100000	E-01

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

	KW -		- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	77 50.		
HOUR	HO	OURLY FRACT	CION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
.900
                         1.000
                                               70.0
                                                         76.0
  9
         1.000
                                    1.000
         1.000
                   .900 1.000
                                   1.000
                                               70.0
                                                         76.0
  10
                                    .800
                   .800
          .800
                          .800
                                               70.0
                                                         76.0
  11
                                    .400
                                               70.0
                                                         76.0
  12
          .500
                    .500
                            .400
                                               70.0
                                                         76.0
  13
           .800
                    .800
                            .800
                                    .800
                    .900 1.000
                                              70.0
                                                         76.0
  14
         1.000
                                   1.000
                                   1.000
                                              70.0
                                                         76.0
 15
         1.000
                    .900 1.000
                   .900
                                              70.0
                                                         76.0
         1.000
                         1.000
                                   1.000
 16
                    .800
                         1.000
                                              70.0
                                   1.000
                                                         76.0
         1.000
 17
                          .100
                                    .100
                                              70.0
                                                         76.0
          .200
 18
                    .200
                           .000
                                              70.0
                                                         76.0
                                     .000
 19
           .100
                    .000
                           .000
                                    .000
                                              70.0
                                                         76.0
                    .000
 20
           .100
                           .000
                                    .000
                                              70.0
                                                         76.0
           .100
                    .000
 21
                           .000
                                               70.0
           .100
                    .000
                                     .000
                                                         76.0
 22
                          .000
                    .000
                                                         76.0
 23
           .100
                                     .000
                                               70.0
                                              70.0
                   .000
                                     .000
                                                         76.0
 24
           .100
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT)
                                         65.000000
SYSTEM TYPE, (IECN) 2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
                            0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR 24.00000

TEMP (TMXAIR) 55.000000
SYSTEM SUPPLY AIR START TIME HR
                              24.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                                            .451
                                                   .400
        .191 .200 .286 .300 .369
                                            .718
                                                    .800
                                                             .812
         .537
                 .600
                          .625
                                   .700
.500
         .906
                 1.00
                         1.00
.900
CHILLER TYPE (ITYPCH)
                          4
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                    .000
        .000 .000 .000 .000
                                                              000
                                   .000
                                           .000
.000
         .000
                 .000
                          .000
                                                    .000
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.000
        .000
                 .000
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BLDG 625 - BATTALION HQ BASELINE

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

			SOLAR THRU		PARTITM DOOR AND	1			VENT AND	
MNT	H LOAD				SLAB.	BSMT	WALL	MUNDOM		LATENT
	.00		7.38							
	-76.47	LOSS		-1.14				-7.08 -		
								,	, , , , ,	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.06	.00	.00	.00
	-58.94	LOSS			-7.54			-6.02 -6		
MAR	.94	GAIN	11.72	.00	.00	.00	.78	.00	.00	.02
	-45.17	LOSS			-7.02			-5.59 -9		
APR	10.37	GAIN	11.93	.01	.04	.00	2.43	.03	.27	1.64
	-16.81	LOSS			-4.19			-3.34 -3		.00
MAY	25.18	GAIN	13.07	.03	.14	.00	4.54	.11	.87	6.48
	-1.92	LOSS		24	-2.52			-1.94 -1		
JUN	60.38	GAIN	13.17	.09	.40	.00	6.92	.32	2.62	25.55
	.00	LOSS		09	-1.19	.00	62	91 -	-8.72	.00
JUL	84.52	GAIN	13.38	.18	1.02	.00	9.25	.82	6.90	36.33
	.00	LOSS		05	73	.00	29	57 -	-5.45	.00
AUG		GAIN	11.73	.13	.77	.00	7.76	.60	4.98	35.96
	.00	LOSS		05	81	.00	36	62 -	-5.27	.00
SEP	43.52		10.12		.39		4.51			
	-2.94	LOSS		21	-1.97	.00	-1.94	-1.55 -1	14.61	.00
o om		~~~~								
	8.73		8.62					.05		
	-14.07	LUSS		52	-4.00	.00	-5.62	-3.12 -2	29.31	.00
NOV	1.48	CATN	<i>c</i> 02	0.0	0.0	0.0	2.1	0.0	0.0	
	-35.42		6.92		.00 -5.76			.00		.40
	-33.42	LOSS		/6	-5.76	.00	-9.96	-4.49 -4	13.86	.00
DEC	.00	CATM	6 15	0.0	.00	0.0	0.1	0.0	0.0	0.0
	-74.70				-8.71			.00 -6.85 -7		.00
	- /4./0	поза		-1.14	-0.71	.00	-17.27	-6.85 -/	0.54	.00
ጥርጥ	314.	GATN	124	0	3.	0	20	2	10	129.
101	-326.		124.		-53.					
	J & U .	2000		٠.	- 55.	0.	-04.	-42	722.	0.
MAX	HEATING	LOAD=	-272	020. F	ת אט אטדנ	EC 18	HOIIR 8	ΔΜΩΤΕ	אים יינאי	P 1.
MAX	COOLING	LOAD=	283	222. F	BTUH ON D	UL 23	HOUR 14	AMRIE	משיר יותי	P 68.
									F 711,1	. 56.

ZONE UA BTU/HR-F 1408.0

BEACON Energy Analysis By EMC Engineers, Inc. 625.I

BLDG 625 - BATTALION HQ BASELINE

T1100001	. .								FAN T	OTAL
INTERN. MONTH	INTE:	PERAT			(COIN- CIDENT AMBT.		PROCESS MILLION BTU		
JAN	70.	76.	69.			62. 4.	3.32	12.81	4.22	24.09
FEB	70.	76.	69.	13 2		64. 14.	2.95	11.38	3.81	21.47
MAR	71.	77.	69.			72. 15.	3.26	12.57	4.22	23.72
APR	73.	78.	69.	30 9		84. 30.	3.14	12.09	4.08	22.85
MAY	75.	78.	70.	15 11		80. 39.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.	27 17		89. 57.	3.14	12.09	4.08	22.85
JUL	77.	78.	73.	13 10		91. 60.	3.26	12.57	4.22	23.72
AUG	77.	78.	71.	30 25		87. 55.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.	11 15		85. 39.	3.08	11.86	4.08	22.48
OCT	73.	78.	69.	5 28			3.32	12.81	4.22	24.09
NOV	71.	77.	69.			75. 18.	3.20	12.33	4.08	23.22
DEC	70.	74.	67.				3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

BEACON Energy Analysis By EMC Engineers, Inc. 625.I

BLDG 625 - BATTALION HQ BASELINE

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHE	N MAXIMUM	LOADS
		INCLUDING	LOADS WE	RE NOT MET	BT	J
MONTH	HEATING	ECONOMIZER	HEATING	COOLING	HEATING	COOLING
JAN	655	2	1	0	2720E+06	.0000
FEB	535	0	0	0	2328E+06	.0000
MAR	477	29	0	0	2352E+06	.1053E+06
APR	239	149	0	0	1465E+06	.1556E+06
MAY	38	317	0	0	9833E+05	.1914E+06
JUN	0	483	0	0	.0000	.2522E+06
\mathtt{JUL}	0	607	0	0	.0000	.2832E+06
AUG	0	589	0	0	.0000	.2581E+06
SEP	65	367	0	0	9602E+05	.2404E+06
OCT	237	130	0	0	1369E+06	.1826E+06
NOV	435	39	0	0	1979E+06	.1295E+06
DEC	684	0	10	0	2720E+06	.0000
YEAR	3365	2712	11	0	2720E+06	.2832E+06

SYSTEM TOTALS

			Y CONSUMPT			TAL INTERNAL	
	HEATING MILLION	COOLING THOUSAND	LIGHTING THOUSAND	PROCESS MILLION	FANS THOUSAND	HEAT GAIN MILLION	ELECTRIC DEMAND
MONTH		KWH	KWH	BTU	KWH	BTU	KW
JAN	107.34	.00	3.32	12.81	1.24	24.09	12.6
FEB	83.82	.00	2.95	11.38	1.12	21.47	12.6
MAR	66.95	.08	3.26	12.57	1.24	23.72	20.8
APR	27.43	.85	3.14	12.09	1.20	22.85	23.8
MAY	3.62	1.96	3.32	12.81	1.24	24.09	26.2
JUN	.00	4.50	3.14	12.09	1.20	22.85	30.7
JUL	.00	6.32	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.91	3.32	12.81	1.24	24.09	31.2
SEP	5.79	3.29	3.08	11.86	1.20	22.48	29.8
OCT	24.56	.70	3.32	12.81	1.24	24.09	25.6
NOV	54.86	.12	3.20	12.33	1.20	23.22	22.2
DEC	106.71	.00	3.20	12.33	1.24	23.35	12.6
YEAR	481.08	23.72	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 153870. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ BASELINE

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2720E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2328E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.1053E+06	2352E+06
APR	2312.	1600.	1.000	55.	0.	Ο.	0	0	.1556E+06	1465E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1914E+06	9833E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2522E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2581E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2404E+06	9602E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.1826E+06	1369E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1295E+06	1979E+06
DEC	883.	604.	1.000	35.	0.	Ο.	0	0	.0000	2720E+06

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BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS
 ----- PROGRAM CONTROL OPTIONS -----
 COOLING ON WEEKEND (1=YES, 0=NO) (ICWK)
 ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
 WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
 LAST CASE FLAG (1=YES, 0=NO) (LSTCS) 1
 SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ) 1
 WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
 WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
 ----- SITE AND BUILDING DATA -----
 *****REAL WEATHER FROM DISK*****
  FILE NAME MO
 STATION 13995 YEAR 1955
 SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000
MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
 SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
 SOLAR ABSORBTIVITY OF ROOF (ALFRF) 3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
 INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
 INITIAL TEMPERATURE OF BUILDING MASS (TO)
                                                70.000000
 INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
 INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
 VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
 FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
 CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
       .850 .850 .850 .850 .850
1.00 1.00 1.00 1.00 1.00
1.00 .850 .850 .850 .850
 . 850
                                                   .850 .850
 1.00
                                                             1.00
                                                                        1.00
 1.00
                                                                        .850
                                                              .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                  WALL DATA
                                 1 2
WALL NUMBER
                                                     3
AZIMUTH ANGLE (AZ)
                                            90.00
                                  .00
                                                      180.00
                                                                -90.00
WALL AREA SOFT (AWLL)
                              1000.0
135.0
                                           849.0
                                                              482.0
                                                     1039.0
                               135.0 90.0 180.0

10.0 10.0 10.0

13.5 9.0 18.0

.0 .0 .0 .0
WINDOW AREA SQFT (AWND)
                                                               105.0
                               135.0
WINDOW HEIGHT FT (WNDH)
                                                               10.0
WINDOW WIDTH FT (WNDW)
WIDTH OF OVERHANG (WOH)
OVERHANG HGT ABV WNDW (HOH)
                                                                10.5
                                                                .0
                                                                  .0
```

MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0	120.0	120.0	120.0
U VALUE BTU/(HR-SQFT-F) (UW)	.064	.064	.064	.064
WALL TRANSFER FUNCTIONS				
		.00176	.00176	.00176
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000	.00000
N=2	.00016	.00016	.00016	.00016
N=3	.00086	.00086	.00086	.00086
N=4	.00066	.00066	.00066	.00066
N=5	.00008	.00008	.00008	.00008
N=6	*****	*****	.00000 .00016 .00086 .00066 .00008	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1	1.00000	1.00000	1.00000	1.00000
N=1 N=2 N=3 N=4	-1.71064	-1.71064	-1.71064	-1.71064
N=3	.89735	.89735	.89735	.89735
N=4	16643	16643	16643	16643
N=5	.00728	.00728	.00728 00002	.00728
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 5795	.000000			
ROOF U VALUE BTU/HR-SQFT-F (UR	F) 3.80	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)	ES, 0=NO)	(IROOF)	1	
ROOF C TRANSFER FUNCTION (CNR)	2.0210	78E-04		
ROOF B TRANSFER FUNCTIONS (BNR)			
.000 .186E-05 .279E-04	.922E-04	.689E-04	.130E-04	
ROOF D TRANSFER FUNCTIONS (DNR)			
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			0000	
SKYLIGHT HEIGHT FT (SKH) 0.	000000E+00			
SKYLIGHT WIDTH FT (SKW) 0.0				
SKYLIGHT OVERHANG WIDTH FT (SK				
OVERHANG HEIGHT ABOVE SKYLIGHT				
SKYLIGHT GLASS NUMBER (NS) SKYLIGHT SHADING COEFFICIENT (1			
SKYLIGHT SHADING COEFFICIENT (SHSK) 0	.000000E+0	00	
SUMMER START MONTH AND DAY FOR				
SUMMER END MONTH AND DAY FOR S			1	1
SKY LIGHT AREA SQFT (ASKY) DAYTIME SKY LIGHT U BTU/SQFT-H	0.00000E+	100	202000	
NIGHT TIME SKYLIGHT U BTU/SQFT-H	K-F (SKIU)	T.T.)	. ∠ J ∠ J J J J J J J J J J J J J J J J	
FRACTION OF PROCESS HEAT TO IN				E-01
FRACTION OF PROCESS HEAT TO IN	IERNAL SPA	CE (PAP)	4.10000	E-01

	KW -	. 	- BTU/HR -			
			PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HO	OURLY FRACT	CION OF PE.	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

9	1.000	.900	1.000	1.000	70.0	76.	0
10	1.000	.900	1.000	1.000	70.0	76.	0
11	.800	.800	.800	.800	70.0	76.	0
12	.500	.500	.400	.400	70.0	76.	0
13	.800	.800	.800	.800	70.0	76.	0
14	1.000	.900	1.000	1.000	70.0	76.	0
15	1.000	.900	1.000	1.000	70.0	76.	0
16	1.000	.900	1.000	1.000	70.0	76.	0
17	1.000	.800	1.000	1.000	70.0	76.	0
18	.200	.200	.100	.100	70.0	76.	0
19	.100	.000	.000	.000	70.0	76.	0
20	.100	.000	.000	.000	70.0	76.	0
21	.100	.000	.000	.000	70.0	76.	0
22	.100	.000	.000	.000	70.0	76.	0
23	.100	.000	.000	.000	70.0	76.	0
24	.100	.000	.000	.000	70.0	76.	0
NO HEAT	ING ABOVE AMB	IENT TEMP	. OF (THLK	OT) 65	.000000		
	ING BELOW AMB						
	TYPE, (IECN)		2				
SUPPLY 2	AIR CFM (SACF	M) 943	0.00000				
ECONOMI	ZER HIGH TEMP	LIMIT F	68.00	0000			
SYSTEM	SUPPLY AIR ST	ART TIME I	HR 0.000	0000E+00			
SYSTEM	SUPPLY AIR ST	OP TIME H	R 24.	.000000			
SYSTEM I	MIXED AIR TEM	P(TMXAIR)	55.00	00000			
MIN OUT	SIDE AIR FRAC	TION OF SE	ACFM (OAFR)	1.0000	00E-01		
FAN EFF	ICIENCY (EFAN) 5.500	0000E-01				
	AL PRESSURE I						
	PLANT RATED						
	PLANT RATED						
HEATING	PLANT PART L						
.100	.191	.200	.286	.300	.369	.400	.451
.500	.537	.600	.625	.700	.718	.800	.812
.900	.906	1.00	1.00				
	TYPE (ITYPCH		4				
	PLANT RATED						
	PLANT RATED						
	PLANT PART L					000	000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000	.000	.000	.000	.000
.000	.000	.000	.000				

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

					PARTI	TN				
			SOLAR		D00	R			VENT	•
			THRU		AND				AND	
MNT	H LOAD		WINDOW	ROOF	SLAB	BSMT	WALL	WINDO	W INFL	LATENT
JAN	.00	GAIN	7.38	.00	.00	.00	.00	.00	.00	.00
	-64.08	LOSS		-1.15	-8.93			-7.10	-73.90	.00
FEB	.00	GAIN	9.28	.00	.00	.00	.00	.00	.00	.00
	-49.90	LOSS		95	-7.58	.00	-3.40	-6.05	-62.67	.00
	.98	GAIN	11.72	.00	.00	.00	.04	.00	.00	.03
	-38.43	LOSS		84	-7.04	.00	-2.54	-5.61	-56.95	.00
APR	9.98	GAIN	11.93	.01	.04	.00	.32	.03	.26	1.65
	-14.32	LOSS		48	-4.19	.00	-1.08	-3.34	-31.95	.00
MAY		GAIN	13.07		.14				.87	6.43
	-1.61	LOSS		24	-2.50	.00	24	-1.92	-18.73	.00
JUN		GAIN	13.17		.40		1.66			24.03
	.00	LOSS		08	-1.16	.00	.00	89	-7.96	.00
JUL	75.27	CA TAT	12 20	10						
ООТ		GAIN LOSS	13.38	05	1.02 72				6.92	33.50
	.00	TO22		05	12	.00	01	56	-5.30	.00
AUG	70.41	GAIN	11.73	.13	.77	.00	1 97	60	4.99	32.64
	.00	LOSS	±±.,5		80				-5.07	
						.00	.01	.01	5.07	.00
SEP	39.47	GAIN	10.12	.05	.39	.00	1.00	.32	2.74	18.06
	-2.46	LOSS		21			28			
OCT	8.46	GAIN	8.62	.00	.06	.00	.16	.05	.38	2.57
	-11.22	LOSS		52	-4.04	.00	-1.29	-3.14	-29.69	.00
	1.62		6.92		.00	.00	.01	.00	.00	.44
	-28.86	LOSS		76	-5.79	.00	-2.55	-4.52	-44.24	.00
	.00						.00			.00
	-62.22	LOSS		-1.14	-8.73	.00	-4.54	-6.87	-70.74	.00
mom.	205	G3 T17	104	•	_		_	_		
101	285. -273.		124.		J.	0.	8. -20.	2.	19.	119.
	-2/3.	TO22		-6.	-53.	U.	-20.	-42.	-422.	0.
MAY	НЕДТІМО	-מבטיז	-260	667 1	יאר עוויים	חבר זפ	HOITE 4	71.3/17	TOMO DO	AD =
	HEATING COOLING		283	292 1	MO HITTS	TIII. 23	HOUR 14	AMB	TENT TE	MP CO
	20021110	20170-	203	I	51011 ON	оо <u>н</u> 23	1100K 14	AMB	TEMI IF	MP 68.

ZONE UA BTU/HR-F 801.3

BEACON Energy Analysis By EMC Engineers, Inc. 625FG.I

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

INTERN	א. דא								FAN T	COTAL
INIERN		RNAL	SPACE		C	COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
	TEM	PERAT	URE F			CIDENT		MILLION		
MONTH	AVG.	MAX	MIN	DAY	HR A	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	77.	69.	4 27		62. 4.	3.32	12.81	4.22	24.09
FEB	71.	76.	69.			60. 14.	2.95	11.38	3.81	21.47
MAR	71.	77.	69.			72. 15.	3.26	12.57	4.22	23.72
APR	73.	78.	70.			81. 29.	3.14	12.09	4.08	22.85
MAY	75.	78.	70.			80. 39.	3.32	12.81	4.22	24.09
JUN	76.	78.	71.			85. 57.	3.14	12.09	4.08	22.85
JUL	77.	78.	73.		15 6	91. 60.	3.26	12.57	4.22	23.72
AUG	76.	78.	71.	30 25		87. 51.	3.32	12.81	4.22	24.09
SEP	75.	78.	70.			85. 39.	3.08	11.86	4.08	22.48
OCT	73.	78.	70.	5 28	14 6	77. 33.	3.32	12.81	4.22	24.09
NOV	71.	77.	69.	8 3	15 6	76. 18.	3.20	12.33	4.08	23.22
DEC	70.	75.	69.			59. 0.	3.20	12.33	4.22	23.35
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MAXIMUM	LOADS
		INCLUDING	LOADS WER	RE NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	COOLING	HEATING	COOLING
7737		_	_			
JAN	620	4	0	0	2552E+06	.0000
FEB	504	3	0	0	2062E+06	.0000
MAR	441	30	0	0	2090E+06	.9730E+05
APR	215	137	0	0	1286E+06	.1493E+06
MAY	34	297	0	0	8446E+05	.1777E+06
JUN	0	418	0	0	.0000	.2375E+06
JUL	0	546	0	0	.0000	.2833E+06
AUG	0	518	0	0	.0000	.2471E+06
SEP	61	330	0	0	8332E+05	.2301E+06
OCT	204	127	0	0	1220E+06	.1759E+06
NOV	397	44	0	0	1720E+06	.1279E+06
DEC	640	0	0	0	2607E+06	.0000
YEAR	3116	2454	0	0	2607E+06	.2833E+06

SYSTEM TOTALS

	HEATING MILLION	ENERG COOLING THOUSAND	Y CONSUMPT LIGHTING THOUSAND	TION PROCESS MILLION	TO FANS THOUSAND	OTAL INTERNAL HEAT GAIN MILLION	MAXIMUM ELECTRIC DEMAND
MONTH	BTU	KWH	KWH	BTU	KWH	BTU	KW
JAN	92.45	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.87	.00	2.95	11.38	1.12	21.47	12.6
MAR	58.16	.09	3.26	12.57	1.24	23.72	20.3
APR	23.83	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.07	1.86	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.10	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.64	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.27	3.32	12.81	1.24	24.09	30.3
SEP	5.13	2.98	3.08	11.86	1.20	22.48	28.9
OCT	20.10	.68	3.32	12.81	1.24	24.09	25.1
NOV	46.54	.14	3.20	12.33	1.20	23.22	22.1
DEC	91.43	.00	3.20	12.33	1.24	23.35	12.6
YEAR	413.58	21.58	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 140960. BTU/(SQFT-YEAR)

BEACON Energy Analysis By EMC Engineers, Inc. 625FG.I

BLDG 625 - BATTALION HQ - ECO-1 INSTALL 3.5" FIBERGLASS INSUL. ON WALLS

OTHER MONTHLY STATISTICS

	CLEAR DAY SOLAR INSOL. HORIZ.	ACTUAL SOLAR INSOL. HORIZ.				÷	HOUR.	s when	MUMIXAM	MAXIMUM
	SURF.	SURF.		AVG.	MAX SYS			M LOADS	COOLING	HEATING
	BTU/ SOFT-	BTU/ SOFT-	PF	AMBT. DEG.	TEMP. DEG.		COOL	MET HEAT	LOAD BTU	LOAD BTU
MONTH	_	DAY	FACTOR	F	+	-	СООП	HEAT	Б10	В10
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2552E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2062E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9730E+05	2090E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1493E+06	1286E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1777E+06	8446E+05
JUN	2647.	1993.	1.000	72.	0.	Ο.	0	0	.2375E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2833E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	0.	0	0	.2471E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	0.	0	0	.2301E+06	8332E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.1759E+06	1220E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1279E+06	1720E+06
DEC	883.	604.	1.000	35.	0.	0.	0	0	.0000	2607E+06

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BLDG 625 - BATTALION HO - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS
----- PROGRAM CONTROL OPTIONS -----
COOLING ON WEEKEND (1=YES, 0=NO) (ICWK) 1
ROOF HAS VENTED ATTIC (1=YES, 0=NO) (IATIC)
WEEKEND INTERNAL GAINS FACTOR (WKEND) 5.000000E-01
LAST CASE FLAG (1=YES, 0=NO) (LSTCS)
SKY CLEARNESS FACTOR (CLN) 1.000000
NUMBER OF ZONES (NZ)
WEATHER SOURCE ISW=0 WEATHER ON TAPE6, ISW=1
WEATHER AS SPECIFIED IN TAVE, ECT. (ISW)
----- SITE AND BUILDING DATA ------
*****REAL WEATHER FROM DISK******
 FILE NAME MO
STATION 13995 YEAR 1955
SITE LATITUDE DEG (AL1) 37.750000
ELEVATION ABOVE SEA LEVEL IN FEET (ELEV) 1158.000000 MEAN AMBIENT TEMP FOR YEAR DEG F (TMAMB) 56.000000
AMPLITUDE OF GROUND TEMP SWING DEG F (AMGRN) 20.000000
SOLAR ABSORBTIVITY OF WALLS (ALPHA) 6.800000E-01
SOLAR ABSORBTIVITY OF ROOF (ALFRF)
                                             3.500000E-01
SOLAR REFLECTANCE OF GROUND (RHOG) 2.000000E-01
INITIAL TEMP OF AIR IN BUILDING DEG F (TAO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INITIAL TEMPERATURE OF BUILDING MASS (TO) 70.000000
INSIDE SUMMER HUMIDITY RATIO LBS/LBS (HRS) 9.000000E-03
INSIDE WINTER HUMIDITY RATIO LBS/LBS (HRW) 0.000000E+00
VOLUME OF ZONE IN CUBIC FEET (VOLHS) 66521.000000
FLOOR AREA (SQFT) 5795.000000
HEATING COIL MAX HEATING RATE BTU/HR (QHMAX) 272020.000000
COOLING COIL MAX COOLING RATE BTU/HR (QCMAX) -334850.000000
COND BETWEEN BLDG AIR AND MASS BTU/HR-F (GA) 57950.000000
CONSTANT INFILTRATION RATE CFM (CFMI) 435.000000
INFILTRATION PROFILE
.850 .850 1.00
1.00 1.00 1.00
                                                                      .850
                                                                                  .850
A FACTOR IN INFILTRATION EQUATION (CINA) 3.920000E-01
B FACTOR IN INFILTRATION EQUATION (CINB) 2.165000E-02
C FACTOR IN INFILTRATION EQUATION (CINC) 8.330000E-03
BUILDING THERMAL MASS MCP BTU/F (CMCP) 69132.000000
BASEMENT UA FACTOR BTU/HR-F (BSNF) 0.000000E+00
SLAB ON GRADE FACTOR BTU/HR-F (SLBF) 288.000000
PARTITION UA BTU/HR-F (GUA) 0.000000E+00
DOOR UA BTU/HR-F (DUA) 49.200000
WINDOW GLASS NUMBER (NG) 30
DAY TIME WINDOW U BTU/HR-SQFT-F (WNDUO) 6.930472E-01
NIGHT TIME WINDOW U BTU/HR-SQFT-F (WNDUN) 6.930472E-01
WINDOW SHADING FACTOR (SHD) 6.200000E-01
                                       WALL DATA
                                      1 2
                                                             3 4
WALL NUMBER
AZIMUTH ANGLE (AZ) .00 90.00 180.00 -90.00 WALL AREA SQFT (AWLL) 1000.0 849.0 1039.0 482.0 WINDOW AREA SQFT (AWND) 135.0 90.0 180.0 105.0 WINDOW HEIGHT FT (WNDH) 10.0 10.0 10.0 10.0 WINDOW WIDTH FT (WNDW) 13.5 9.0 18.0 10.5 WIDTH OF OVERHANG (WOH) .0 .0 .0 .0 .0 OVERHANG HGT ABV WNDW (HOH) .0 .0 .0 .0 .0
AZIMUTH ANGLE (AZ)
                                                  90.00 180.00 -90.00
                                       .00
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MAX SOLAR WITH NO SHADE (SOLMX) U VALUE BTU/(HR-SQFT-F) (UW)	120.0 .055	120.0 .055	120.0 .055	120.0 .055
WALL TRANSFER FUNCTIONS				
CN FACTORS NUMBER OF BN FACTORS (NB	.00174	.00174	.00174	.00174
NUMBER OF BN FACTORS (NB	5	5	5	5
BN FACTORS BN (BN)				
N=1	.00000	.00000	.00000 .00019	.00000
N=2	.00019	.00019	.00019	.00019
N=3	.00089	.00089	.00089	.00089
N=4	.00059	.00059	.00059	.00059
N=5	.00007	.00007	.00007	.00007
N=1 N=2 N=3 N=4 N=5	*****	******	*****	*****
NUMBER OF DN FACTORS (ND)	6	6	6	6
DN FACTORS				
N=1 N=2 N=3 N=4	1.00000	1.00000	1.00000	1.00000
N=2	-1.66125	-1.66125	-1.66125	-1.66125
N=3	.83196	.83196	.83196	.83196
N=4	14508	14508	14508	14508
N=5	.00613	.00613	.00613	.00613
N=6	00002	00002	00002	00002
ROOF AREA SQFT (AROF) 5795	.000000		.00613 00002	
ROOF U VALUE BTU/HR-SQFT-F (UR)	F) 3.80	0000E-02		
ROOF TRANS FUNCTIONS USED (1=Y)				
ROOF C TRANSFER FUNCTION (CNR)	2.0210	78E-04		
ROOF B TRANSFER FUNCTIONS (BNR)				
.000 .186E-05 .279E-04		.689E-04	.130E-04	
ROOF D TRANSFER FUNCTIONS (DNR)				
1.00 -1.97 1.36	410	.534E-01	250E-02	
SKYLIGHT TILT DEGREES (TILT)				
SKYLIGHT AZIMUTH ANGLE DEGREES			0000	
SKYLIGHT HEIGHT FT (SKH) 0.0				
SKYLIGHT WIDTH FT (SKW) 0.00				
SKYLIGHT OVERHANG WIDTH FT (SKO				
OVERHANG HEIGHT ABOVE SKYLIGHT		0.0000	000E+00	
SKYLIGHT GLASS NUMBER (NS)				
SKYLIGHT SHADING COEFFICIENT (S	SHSK) 0	.000000E+0		_
SUMMER START MONTH AND DAY FOR SUMMER END MONTH AND DAY FOR SH	SHSK (MST	, NDST)	1	1
SKY LIGHT AREA SQFT (ASKY)	OCCOOR	עמאט)	1	1
			202000	
DAYTIME SKY LIGHT U BTU/SQFT-HE NIGHT TIME SKYLIGHT U BTU/SQFT-	HB-E (GKAI	TNI)	1 20200	
FRACTION OF PROCESS HEAT TO INT	TERNAL SPA	CE (FAP)	4 100000	₹- 0 1
		\/	1.1000001	

-----INTERNAL GAINS AND PROFILES -----

THERMOSTAT SET POINT DEG F

					FOINT D	EG F
	KW -		- BTU/HR - PEOPLE	PEOPLE		
	LIGHTS	PROCESS S	SENSIBLE	LATENT	HEATING	COOLING
PEAK VAL	11.	21850.	12250.	7750.		
HOUR	HC	URLY FRACT	TION OF PE	AK		
1	.100	.000	.000	.000	70.0	76.0
2	.100	.000	.000	.000	70.0	76.0
3	.100	.000	.000	.000	70.0	76.0
4	.100	.000	.000	.000	70.0	76.0
5	.100	.000	.000	.000	70.0	76.0
6	.100	.000	.000	.000	70.0	76.0
7	.800	.500	.800	.800	70.0	76.0
8	1.000	.800	1.000	1.000	70.0	76.0

```
1.000 70.0
                        1.000
        1.000 .900
                                                        76.0
  9
                                             70.0
70.0
                                  1.000
                                                        76.0
 10
        1.000
                  .900
                          1.000
                  .800
                          .800
                                  .800
                                                        76.0
 11
         .800
                                   .400
                  .500
                           .400
                                             70.0
                                                        76.0
          .500
 12
                                                        76.0
                           .800
                                             70.0
                                   .800
 13
          .800
                  .800
                        1.000
                                             70.0
                                                       76.0
 14
         1.000
                  .900
                                  1.000
                        1.000 1.000
1.000 1.000
1.000 1.000
                                             70.0
                   .900
                                                       76.0
 15
         1.000
                                             70.0
                                                       76.0
         1.000
                   .900
 16
         1.000
                   .800
                                             70.0
                                                       76.0
 17
                   .200
                          .100
          .200
                                             70.0
                                                        76.0
                                   .100
 18
                           .000
                                    .000
                                                        76.0
                   .000
                                             70.0
          .100
 19
                   .000
                           .000
                                    .000
                                             70.0
                                                       76.0
          .100
 20
                           .000
                                             70.0
                                                       76.0
                   .000
                                    .000
 21
           .100
                         .000
                                             70.0
                                                       76.0
                   .000
                                    .000
 22
           .100
                                                        76.0
                                              70.0
 23
          .100
                   .000
                                    .000
                                    .000
                                                        76.0
          .100
                   .000
                                              70.0
NO HEATING ABOVE AMBIENT TEMP. OF (THLKOT) 65.000000
NO COOLING BELOW AMBIENT TEMP. OF (TCLKOT) 65.000000
SYSTEM TYPE, (IECN)
                     2
SUPPLY AIR CFM (SACFM) 9430.000000
ECONOMIZER HIGH TEMP LIMIT F 68.000000
SYSTEM SUPPLY AIR START TIME HR 0.000000E+00
SYSTEM SUPPLY AIR STOP TIME HR
                             24.000000
SYSTEM MIXED AIR TEMP(TMXAIR)
                             55.000000
MIN OUTSIDE AIR FRACTION OF SACFM (OAFR) 1.000000E-01
FAN EFFICIENCY (EFAN) 5.500000E-01
FAN TOTAL PRESSURE IN. WATER (DP) 8.250000E-01
HEATING PLANT RATED OUTPUT BTU (HFLOT) 274000.000000
HEATING PLANT RATED INPUT BTU (HFLIN) 342500.000000
HEATING PLANT PART LOAD VS FRAC OF INPUT TABLE (PLH)
                                               .400
                                                        .451
.100 .191 .200 .286 .300 .369
              .600 .6∠⊃
1.00 1.00
4
         .537
                                           .718
                                  .700
                                                            .812
.500
        .906
.900
CHILLER TYPE (ITYPCH)
COOLING PLANT RATED OUTPUT BTU (CFLOT) 360000.000000
COOLING PLANT RATED INPUT BTU (CFLIN) 82936.000000
COOLING PLANT PART LOAD FRAC VS FRAC RATED COP (PLC)
                                                 .000
                                                          .000
.000 .000 .000 .000 .000
         .000
             .000 .000
                                  .000
                                          .000
                                                   .000
                                                            .000
 .000
 .000
         .000
```

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

ENERGY GAIN/LOSS SUMMARY IN MILLION BTU

SOLAR DOOR VENT THRU AND AND MNTH LOAD WINDOW ROOF SLAB BSMT WALL WINDOW INFL LATE JAN .00 GAIN 7.38 .00 .00 .00 .00 .00 .00 .00 -63.48 LOSS -1.15 -8.93 .00 -3.87 -7.10 -73.92 .00	VT
MNTH LOAD WINDOW ROOF SLAB BSMT WALL WINDOW INFL LATE JAN .00 GAIN 7.38 .00 .00 .00 .00 .00 .00 .00 -63.48 LOSS -1.15 -8.93 .00 -3.87 -7.10 -73.92 .00	T
JAN .00 GAIN 7.38 .00 .00 .00 .00 .00 .00 .00 .00 .00 .0	TV
-63.48 LOSS -1.15 -8.93 .00 -3.87 -7.10 -73.92 .00	
1.13 0.33 .00 -3.87 -7.10 -73.92 .00	
FEB .00 GAIN 9.28 00 00 00 00 00 00	
00. 00. 00. 00.	
-49.45 LOSS95 -7.58 .00 -2.92 -6.05 -62.69 .00	
MAR .98 GAIN 11.72 .00 .00 .00 .04 .00 .00 .03	
.00 .00 .03	
-38.13 LOSS84 -7.04 .00 -2.19 -5.61 -56.99 .00	
APR 9.99 GAIN 11.93 .01 .04 .00 .29 .03 .26 1.65	
-14 22 1088	
48 -4.19 .0094 -3.34 -31.96 .00	
MAY 23.44 GAIN 13.07 .03 .14 .00 .77 .11 .87 6.40	
-1.61 LOSS24 -2.49 .0022 -1.92 -18.71 .00	
.00	
JUN 54.58 GAIN 13.17 .09 .40 .00 1.44 .32 2.63 23.76	
.00 LOSS08 -1.15 .000189 -7.93 .00	
JUL 74.79 GAIN 13.38 .18 1.02 .00 2.03 .82 6.92 33.32	
.00 LOSS0572 .000155 -5.28 .00	
3110 60 05 05 05 0	
AUG 69.85 GAIN 11.73 .13 .77 .00 1.69 .60 4.99 32.33	
.00 LOSS0579 .000161 -5.05 .00	
SEP 39.37 GAIN 10.12 .05 .39 .00 .86 32 2.74 18.06	
-2.45 LOSS21 -1.96 .0025 -1.54 -14.53 .00	
OCT 8.46 GAIN 8.62 .00 .06 .00 .15 .05 .38 2.57	
-11 11 7000	
-11.11 LOSS52 -4.04 .00 -1.12 -3.14 -29.72 .00	
NOV 1.64 GAIN 6.92 .00 .00 .00 .01 .00 .00 .44	
-28.56 LOSS76 -5.79 .00 -2.19 -4.52 -44.27 .00	
1.52 11.27 .00	
DEC .00 GAIN 6.45 .00 .00 .00 .00 .00 .00	
-61.60 LOSS -1.14 -8.73 .00 -3.90 -6.87 -70.75 .00	
TOT 283. GAIN 124. 0. 3. 0. 7. 2. 19. 119271. LOSS -653. 01842422. 0.	
-271. LOSS -653. 01842422. 0.	
MAY HEADING TOOD	
MAX HEATING LOAD= -259456. BTUH ON DEC 18 HOUR 4 AMBIENT TEMP 1	,
MAX COOLING LOAD= 283176. BTUH ON JUL 23 HOUR 14 AMBIENT TEMP 68	

ZONE UA BTU/HR-F 771.0

BEACON Energy Analysis By EMC Engineers, Inc. 625RGD.I

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

INTERN	አተ								FAN T	OTAL
INTERN		RNAT.	SPACE		(COIN-	LIGHTING	PROCESS	HEAT	HEAT GAIN
			URE F			CIDENT		MILLION		
MONTH	AVG.	MAX	MIN	DAY	HR A	AMBT.	KWH	BTU	BTU	BTU
JAN	70.	77.		4		62.	3.32	12.81	4.22	24.09
			69.	27	6	4.				
FEB	71.	76.		26			2.95	11.38	3.81	21.47
			69.	2	6	14.				
MAR	71.	77.		12		72.	3.26	12.57	4.22	23.72
			69.	3	6	15.				
APR	73.	78.				81.	3.14	12.09	4.08	22.85
			70.	14	6	29.				
MAY	75.	78.				80.	3.32	12.81	4.22	24.09
			70.	11	5	39.				
מטע	76.	78.		12		85.	3.14	12.09	4.08	22.85
			71.	17	6	57.				
JUL	76.	78.			15	91.	3.26	12.57	4.22	23.72
			72.	10	6	60.				
AUG	76.	78.			14		3.32	12.81	4.22	24.09
			71.	25	6	51.				
SEP	75.	78.				85.	3.08	11.86	4.08	22.48
			70.	15	6	39.				
OCT	73.	78.		5			3.32	12.81	4.22	24.09
			70.	28	5	31.				
NOV	72.	77.		8		76.	3.20	12.33	4.08	23.22
			69.	3	6	18.				
DEC	70.	75.					3.20	12.33	4.22	23.35
			69.	18	6	0.				
YEAR							38.54	148.46	49.64	280.00

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

NUMBER OF HOURS WHEN HEATING OR COOLING IS REQUIRED

		COOLING	NUMBER OF	HOURS WHEN	MUMIXAM	LOADS
		INCLUDING	LOADS WER	E NOT MET	BTU	J
MONTH	HEATING	ECONOMIZER	HEATING C	OOLING	HEATING	COOLING
JAN	619	4	0	0	2543E+06	.0000
FEB	500	4	0	0	2052E+06	.0000
MAR	440	30	0	0	2082E+06	.9753E+05
APR	216	137	0	0	1281E+06	.1492E+06
MAY	34	296	0	0	8433E+05	.1774E+06
JUN	0	413	0	0	.0000	.2371E+06
JUL	0	543	0	0	.0000	.2832E+06
AUG	0	513	0	0	.0000	.2468E+06
SEP	61	330	0	0	8309E+05	.2297E+06
OCT	204	127	0	0	1216E+06	.1759E+06
NOV	395	44	0	0	1711E+06	.1281E+06
DEC	637	0	0	0	2595E+06	.0000
YEAR	3106	2441	0	0	2595E+06	.2832E+06

SYSTEM TOTALS

MONTH	HEATING MILLION BTU	ENERG COOLING THOUSAND KWH	Y CONSUMPT LIGHTING THOUSAND KWH	PROCESS MILLION BTU	TO FANS THOUSAND KWH	OTAL INTERNAL HEAT GAIN MILLION BTU	MAXIMUM ELECTRIC DEMAND KW
JAN	91.78	.00	3.32	12.81	1.24	24.09	12.6
FEB	72.20	.00	2.95	11.38	1.12	21.47	12.6
MAR	57.81	.09	3.26	12.57	1.24	23.72	20.3
APR	23.80	.83	3.14	12.09	1.20	22.85	23.4
MAY	3.07	1.85	3.32	12.81	1.24	24.09	25.2
JUN	.00	4.07	3.14	12.09	1.20	22.85	29.6
JUL	.00	5.60	3.26	12.57	1.24	23.72	33.0
AUG	.00	5.22	3.32	12.81	1.24	24.09	30.3
SEP	5.12	2.97	3.08	11.86	1.20	22.48	28.8
OCT	20.01	.68	3.32	12.81	1.24	24.09	25.1
NOV	46.17	.14	3.20	12.33	1.20	23.22	22.1
DEC	90.64	.00	3.20	12.33	1.24	23.35	12.6
YEAR	410.60	21.45	38.54	148.46	14.55	280.00	33.0

ENERGY CONSUMPTION PER SQUARE FOOT OF FLOOR 140370. BTU/(SQFT-YEAR)

BLDG 625 - BATTALION HQ - ECO-2 INSTALL 1.5" RIGID INSUL. ON WALLS

OTHER MONTHLY STATISTICS

	SURF. BTU/ SQFT-	ACTUAL SOLAR INSOL. HORIZ. SURF. BTU/ SQFT- DAY	PF FACTOR	AVG. AMBT. DEG. F	MAX SYS TEMP. D DEG. +	RIFT	SYSTE	S WHEN M LOADS MET HEAT	MAXIMUM COOLING LOAD BTU	MAXIMUM HEATING LOAD BTU
JAN	1041.	675.	1.000	35.	0.	0.	0	0	.0000	2543E+06
FEB	1464.	929.	1.000	37.	0.	0.	0	0	.0000	2052E+06
MAR	1922.	1254.	1.000	43.	0.	0.	0	0	.9753E+05	2082E+06
APR	2312.	1600.	1.000	55.	0.	0.	0	0	.1492E+06	1281E+06
MAY	2566.	1826.	1.000	65.	0.	0.	0	0	.1774E+06	8433E+05
JUN	2647.	1993.	1.000	72.	0.	0.	0	0	.2371E+06	.0000
JUL	2546.	2015.	1.000	77.	0.	0.	0	0	.2832E+06	.0000
AUG	2280.	1840.	1.000	76.	0.	Ο.	0	0	.2468E+06	.0000
SEP	1856.	1371.	1.000	68.	0.	Ο.	0	0	.2297E+06	8309E+05
OCT	1437.	953.	1.000	57.	0.	Ο.	0	0	.1759E+06	1216E+06
NOV	1039.	732.	1.000	47.	0.	0.	0	0	.1281E+06	1711E+06
DEC	883.	604.	1.000	35.	Ο.	Ο.	0	0	.0000	2595E+06

E M C No. 1406-011 Date: 2/18/96 Prepared by: DMS

BUILDING MANAGER INTERVIEW

BUILDING INFORMATI	ON:						
Building No: 625)	Building Nan	ne: Battalion H	ead Quarters	MI		
Surveyed by: DM	S	Date:	11/7/95		Building Use:	Administration	& Training
Building Contact:					Phone No:		
Building Contact:					Phone No:		
OCCUPANCY:							
lumber of Employees:	Mon./Fri.:	50		Schedule:	700	То	1700
	Tues./Thurs	50			700	То	1700
	Wed.	50			700	То	1700
	Sat./Sun.	3			800	То	1600
/isitors Per Day:	Mon./Fri.:			Schedule:		То	
	Tues./Thurs					То	
	Wed.					То	
	Sat./Sun.					То	
Comments:							
IGHTING SCHEDULE	:						
Normal Occupancy:	MonFri.:			Schedule:	700	То	1700
	Sat./Sun.:				800	То	1600
Cleaning Crew/2nd Shi				Schedule:		To	
	Sat./Sun.:					То	
EQUIPMENT SCHEDU	LE:						
Fan/AHU Schedule:	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Chiller Schedule:	MonFri.:			Schedule:	0	To	2400
	Sat./Sun.:				0	To	2400
Boiler Schedule:	MonFri.:			Schedule:	0	To	2400
	Sat./Sun.:				0	То	2400
Aux. Equipment Sched	ule:						
	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
	MonFri.:			Schedule:	0	То	2400
	Sat./Sun.:				0	То	2400
Comments:							

Project Name: Limited Energy Study, Insulating Brick Buildings Location: Fort Leonard Wood, Missouri

Building No 625 **Building Name: Battalion Head Quarters**

BUILDING ENVELOPE

		EXTERIOR WALLS	1	IST OF EXT. WALL CONSTRUCTION TYPES
Wall	Wall	1	-	STOLENIA WALL CONSTRUCTION THES
Direction (N,			Wall Construction	
E, W, or S)	No.	Comments	No.	Description
N	XW-1		XW-1	Face Brick & CMU
E	XW-1		XW-2	Face Brick, CMU, & Gyp. Board
S	XW-1		XW-3	Face Brick, CMU, & Ceramic Tile
W	XW-1		XW-4	Face Brick, CMU, & Plaster Coat
			XW-5	Insulated Metal Panel
		WINDOWS		LIST OF WINDOW TYPES
Window Direction (N, E, W, or S)	Window Construction No.	Comments	Window Construction No.	Description
N	W-1	Insulated metal panel on top portion of window	W-I	Double Pane Clear
E	W-1	Insulated metal panel on top portion of window	W-2	Double Pane Tinted
S	W-1	Insulated metal panel on top portion of window	W-3	Single Pane with Storm Windows
W	W-1	Insulated metal panel on top portion of window	W-4	Single Pane
				6.
		Bldg. Entrance has single pane glass		
	1440	ROOF CONSTRUCTION		LIST OF ROOF CONSTRUCTION TYPES
	Roof			
Roof Location	Construction No.	Comments	Roof Construction No.	Description
ALL	R-2	Contains two 3" layers of Batt Insulation above ceiling	R-1	BUR, Rigid Insul., Metal Deck, Air Space, Ceiling Tile
			R-2	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Ceilin Tile
			R-3	BUR, Rigid Insul., Metal Deck, Air Space, Plaster Cl.g
			R-4	BUR, Rigid Insul., Metal Deck, Air Space, 6" Batt Insul., Plaste Clg.
			R-5	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Ceilin Tile
			R-6	Asphalt Shingles, Wood Deck, Air Space, 6" Batt Insul., Plaste Clg.

E M C No. 1406-011

Date: 2/18/96 Prepared by: DMS Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No: 625

Building Name: Battalion Head Quarters

E M C No. 1406-011

Prepared by: DMS

Date: 2/18/96

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

	INTE	RIOR EQUIP	MENT AND OBJECTS		LIST OF EQUIPMENT AND OBJECTS
Wall Direction					
(N, E, W, or S)		No. of Items	Comments	Item No.	Description
·					Architectural
Admin. Area	 	1		A-I	Interior Partitions
N N	M-3	2	1 @ 16'; 1 @ 24'	A-2	Wall Placards
$-\frac{N}{N}$	E-2	1	1	A-3	Wall-Mounted TV Sets
N N	C-3	1		A-4	Drapery Rods, Venician Blinds
N	E-3	1		A-5	Shelves
N N	A-4	12		A-6	Closet Door
			-	A-7	Key Box
E	M-3	3	2 @ 12'; 1 @ 5'	A-8	Pull Down Movie Screen
E	A-5	2	1 0, 1 0 1		Plumbing
E	A-6	1 1		P-1	Sinks
E	A-4	6		P-2	Commodes
				P-3	Toilet Stalls
S	C-3	1		P-4	Water Fountains
S	M-3	2	1 @ 6'; 1 @ 28'	_	HVAC Mechanical
S	A-7	1 1	1 6 0, 1 6 - 2	M-I	Floor Supply/Return Grilles
S	A-7	12		M-2	Ceiling Supply/Return Grilles
	- N.	- '-		M-3	Finned-Tube Baseboard Radiators
Toilet Room			Glazed structural block 4'-0" A.F.F.	M-4	Thermostats / Space Temp. Sensors
S	M-3	1	1@6'	M-5	Wall mounted convection type heater
8	M-6	2	160	M-6	1/2" Hot & Cold Water Piping
S	P-3	2			
S	P-2	2			Electrical
	F-4			E-I	Electrical Panels
				E-2	Electrical Outlets
Clearroom	 	 	1	E-3	Electrical Light Switches
<u>Classroom</u> S	A-8	 1	<u> </u>		Wall Mounted Television
S	E-2	1 2	ļ		
S	E-2 E-3	1			
	E-0				
w	E-4	3			Lighting
₩ —	E-2	5		L-I	Wall Mounted Fixtures
W W	E-2	2		L-2	Ceiling Mounted Fixtures
	M-3	2	2 @ 16'	L-3	Exit Signs
W W	L-3	2	2 6 10	-	
⊩ w	A-3	3			
W W	A-3 A-4	6			Fire Protection
				F-I	Alarm Pull Switches
W-S-N	 		Wall construction: Wood paneling	F-2	Alarm Sound Devices (Speakers, Bells)
VV-O-IV	-	 	3'-0" A.F.F. along perimeter walls.	F-3	Sprinkler Heads
 			3-0 A. a. along pointers.	F-4	Fire Extinguishes
	 				
	+				- Indian
					Communication
	1	T		(-1	Telephones - Wall Mounted
 				(-2	Telephones - Booth Mounted
	T			C-3	Telephone Jacks
	1				
l				N	

Project Name: Limited Energy Study, Insulating Brick Buildings

Location: Fort Leonard Wood, Missouri

Building No: 631

31 Buildir

Building Name: Battalion Head Quarters

E M C No. 1406-011

Prepared by: DMS

Date: 2/18/96

INTERIOR EQUIPMENT AND OBJECTS (Located On or Near Exterior Walls)

			H	Item No. Description		
Item No.	No. of Items	Comments	Item No.	Description		
				Architectural		
**			A-I	Interior Partitions		
M-3	2	1 @ 16'; 1 @ 24'		Wall Placards		
E-2	1		III	Drapery Valances		
	1		11	Drapery Rods		
	1		II II	Shelves		
A-4	12			Closet Door		
			- 41	Key Box		
M-3	3	2 @ 12'; 1 @ 5'	A-8	Pull Down Movie Screen		
A-5	2			Plumbing		
A-6	1		III .	Sinks		
A-4	6			Commodes		
			11	Toilet Stalls		
C-3	1		P-4	Water Fountains		
M-3	2	1 @ 6'; 1 @ 28'		HVAC Mechanical		
A-7	1			Floor Supply/Return Grilles		
A-4	12			Ceiling Supply/Return Grilles		
			ii ii	Finned-Tube Baseboard Radiators		
				Thermostats / Space Temp. Sensors		
	1	1 @ 6'	11	Wall mounted convection type heater		
			M-6	1/2" Hot & Cold Water Piping		
P-3	2					
P-2	2			Electrical		
			LI .	Electrical Panels		
			E-2	Electrical Outlets		
			E-3	Electrical Light Switches		
	2	Halon Fire Suppression System	E-4	Wall Mounted Television		
E-1	1					
	1	Small A.C. Unit				
				Lighting		
F-1	2		L-I	Wall Mounted Fixtures		
E-3	3			Ceiling Mounted Fixtures		
E-4	2	2 @ 16'	L-3	Exit Signs		
F-4	2					
	1					
L-3	1			Fire Protection		
		12' of Electrical Conduit	EI .	Alarm Pull Switches		
				Alarm Sound Devices (Speakers, Bells)		
			III .	Sprinkler Heads		
			F-4	Fire Extinguishes		
				Communication		
			III	Telephones - Wall Mounted		
			11	Telephones - Booth Mounted		
			C-3	Telephone Jacks		
	1	Į.	li li	I .		
	M-3 E-2 C-3 E-3 A-4 M-3 A-5 A-6 A-4 C-3 M-3 A-7 A-4 M-3 P-2 E-1 F-1 E-3 E-4	M-3 2 E-2 1 C-3 1 E-3 1 A-4 12 M-3 3 A-5 2 A-6 1 A-4 6 C-3 1 M-3 2 A-7 1 A-4 12 M-3 1 M-6 2 P-3 2 P-2 2 E-1 1 1 F-1 2 E-3 3 E-4 2 F-4 2 E-2 3	M-3 2 1 @ 16'; 1 @ 24' E-2 1 C-3 1 E-3 1 A-4 12 M-3 3 2 @ 12'; 1 @ 5' A-5 2 A-6 1 A-4 6 C-3 1 M-3 2 1 @ 6'; 1 @ 28' A-7 1 A-4 12 Glazed structural block 4'-0" A.F.F. M-3 1 1 @ 6' P-3 2 P-2 2 Halon Fire Suppression System E-1 1 Small A.C. Unit F-1 2 E-3 3 E-4 2 2 @ 16' F-4 2 E-2 3	M-3 2 1@ 16'; 1@ 24' E-2 1		

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

BLDG: **625**

EMC NO.: 1406-011

DATE:

Feb-96 DMS

PREPARED BY:

AJN

CHECKED BY: FILE: 625AH1

AJI

	AIR HANDLING UNIT SU	RVEY OBSERVATIONS	
AHU-1	AHU NO.	MECH. RM.	LOCATION (RM)
ACCU-1	REF. SYS. SERVING AHU	ALL	SERVES AREA

			UNIT TYP	E:		
	SINGLE ZN	2-PIPE FC	4-PIPE FC	UNIT HTR	H&V	
х	MULTIZONE	DOUBLE DT	REHEAT	INDUCTION	VAV	
5	NUMBER OF ZONES		OTHER			
	COMMENT:					

ORTHIN	GTON				MFG.		CM-18.00			MODEL
7.5	SUPPLY FAN HP		DAYTON		MFG.		2N985G			MODEL
	RET/EXH FAN HP				MFG.					MODEL
9430	CFM-HTG	9430	CFM-CLG	17%	MIN %OA	100%	MAX %OA	73.5%	% HTG AREA	SERVED

					COILS:				
х	NONE		STM		HW	ELEC		MOD VLV	PREHEAT
	NONE		STM	х	нw	ELEC	х	MOD VLV	HEATING
х	NONE		STM		нw	ELEC		MOD VLV	REHEAT
х	NONE		STM		нw	EVAP MEDIA		MOD VLV	HUMID.
	NONE	х	DX		cw		х	MOD VLV	COOLING

				(OPERATI	ON:					
HOURS (ON:		s	м	т	w	т	F	S	COMMENTS	
PRESENT S	START TIME		800	700	700	700	700	700	800	TIMECLOCK?	
PRESENT S	STOP TIME		1600	1700	1700	1700	1700	1700	1600	YES	
REQUIRED	START TIME										
REQUIRED	STOP TIME										
MONTHS	S ON:	-									
J	F	М	Α	м	J	J	Α	S	0	N	D
1	1	1	1	1	1	1	1	1	1	1	

				CONTRO	LS:	· · · · · · · · · · · · · · · · · · ·			
	х	PNEUMATIC		ELECTRIC		ELEC'NIC		DDC	COMMENTS
THERMOSTAT TYPE:		SINGLE STPT		DUAL SETPNT		SETBACK		D	AMPERS CONNECTED
SPACE SETPOINT (oF):		OCC HEAT		UNOCC HEAT		OCC COOF		UNOCC COOL	& WORKING
OTHER SETPOINTS (oF):	N/A	HOT DECK	N/A	COLD DECK	N/A	MIXED AIR		OTHER	
DAMPER CONTROL:	N	MIN OA (Y/N)	Υ	MAX OA (Y/N)	Y	RA (Y/N)	N	EA (Y/N)	
		MA CONTROL		ECONO-DB		ECONO-ENT		OTHER	
DEMAND LIMIT:	Υ	YES		NO					
COMMENTS:						·			

EMC ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE:

Feb-96

PREPARED BY: CHECKED BY: DMS AJN 625CH1

BLDG: **625**

FILE:

REFRI	GERATION EQUIPMENT	SURVEY OBSERVATION	IS
ACCU-1	CHILLER/COMPRESSOR NO.	OUTSIDE MECH. RM.	LOCATION (RM)

				UNIT	YPE:		
	CENTRIFUG	AL WITH W	ATER SIDE COO	LING TOWER		OTHER	
	RECIPROCA	TING WITH	WATER SIDE CO	OOLING TOWER	AHU-1	AHU'S SERVED	
	RECIPROCA	TING WITH	AIR COOLED CO	NDENSING UNIT			
	ABSORBTIC	N WITH WA	TER SIDE COOL	ING TOWER			
х	AIR COOLE	D CONDENS	ING UNIT				
	снw	х	DX	OTHER			

					NAM	EPLATE:				
CHILLER	EATHER KIN	MFG.	4172-2-40B			MODEL	1821120354	11		SERIAL NO.
230	VOLTS	140	AMPS	3	РН	60	HZ		CAPACITY (rons)
TOWER		MFG.				MODEL				2 # OF FANS
230	VOLTS	8.4	AMPS	3	PH	60	HZ	3	HP each	
CW PUMP		MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		РН		HZ		НР	
CNW PUM	Р	MFG.				MODEL				SERIAL NO.
	VOLTS		AMPS		PH		HZ		НР	
COMMENT	S:						•		<u> </u>	

		and in		(OPERATI	ON:					
HOURS C	N:		s	м	Т	w	т	F	s	COMMENT	
PRESENT S	TART TIME		800	700	700	700	700	700	800	TIMECLOCK?	
PRESENT S	TOP TIME		1600	1700	1700	1700	1700	1700	1600	YES	
REQUIRED S	START TIME									· · · · · · · · · · · · · · · · · · ·	
REQUIRED S	STOP TIME										***
MONTHS	ON:						•				
J	F	М	Α	М	J	J	Α	s	0	N	D
0	0	0	0	1	1	1	1	1	0	0	0

	PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
SETPOINTS	CWS (oF)	CWR (oF)	CNWS (oF)	CNWR (oF)	
PANEL INDICATORS					
- PRESSURE	LITE-HI	LITE-LOW	GAUGES		
- TEMPERATURE	LITE-HI	LITE-LOW	GAUGES		
- OTHER					
COMMENTS:					

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011 DATE:

Feb-96 **DMS**

PREPARED BY: CHECKED BY:

AJN

	BLDG:	625	FILE:	625RD1
	PERIMETER RADIAT	ION SURVEY OB	SERVATIONS	
RAD-1	PER RAD NO.		MECH. RM.	LOCATION (RM)
CV-1	SOURCE OF HEATING		ALL	SERVES AREA

			UNIT TYPE:	 ~~~	- 110 	
STEAM	x	HW	ELECTRIC			
OTHER				 		
COMMENT:				 		

	NAMEPLATE:		
HW PUMP 1 - HP	MFG.		MODEL
HW PUMP 2 - HP	MFG.		MODEL
HW PUMP 3 - HP	MFG.		MODEL
HW PUMP 4 - HP	MFG.		MODEL
OMMENT:		26.5% % AREA HEA	TING

					OPERAT	ION:				······································	
HOURS	ON:		s	М	Ŧ	w	Т	F	s	COMMENT	
PRESENT S	START TIME		0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT S	STOP TIME		2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED	START TIME										
REQUIRED	STOP TIME				1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1						
MONTHS	S ON:								·	·	.
j	F	М	Α	М	j	J	Α	s	0	N	D
1	1	1	0	0	0	0	0	0	1	1	1

			CONTROLS	S:		
		PNEUMATIC	ELECTRIC	ELEC'NIC	DDC	COMMENTS
RADIATION CONTROL:	х	NONE	2-WAY VLV	3-WAY VLV	OTHER	
SPACE SETPOINT (oF):		OCC HEAT	UNOCC HEAT	OCC COOL	UNOCC COOL	
RESET CONTROL (oF):		HW HIGH	HW LOW	OA LOW	OA HIGH	

E M C ENGINEERS, INC.

PROJECT: LIMITED ENERGY STUDY, INSULATE BRICK BUILDINGS

CLIENT CONTRACT NO.: DACA 01-94D-0033

LOCATION: FT. LEONARD WOOD

EMC NO.: 1406-011

DATE: PREPARED BY: Feb-96

CHECKED BY:

DMS AJN

FILE: **625CV1**

	BLDG:	625	FILE:	625CV1
	BOILER & CONVERTER	SURVEY OBS	ERVATIONS	
CV-1	BOILER/CONVERTER NO.		MECH. RM.	LOCATION (RM)
C.P.	SOURCE OF HEATING (PLANT)		ALL	SERVES AREA

			UNIT TYPE	:	
	STEAM	PSIG	нw	ТЕМР.	BOILER TYPE:
	NO.2 OIL	NO.6 OIL	N.GAS	ELEC	FUELS:
Х	STM/HW	HTHW/HW	HTHW/STM	OTHER	CONVERTER TYPE:
х	SPACE HEAT	DHW	OTHER		USE:
СОММЕ	NT:				% HTG AREA SERVED
					BB RADIATION ONLY

N/A	MFG.	N/A	MODEL	290000	CAPACITY OUTPUT (BTUH)
				305263	CAPACITY INPUT (BTUH)
	MFG.		MODEL		CAPACITY OUTPUT (BTUH)
					CAPACITY INPUT (BTUH)
0.75	HW PUMP 1 - HP	DUNHAM-BUSH	MFG.	1A5C431-2	MOD
	HW PUMP 2 - HP		MFG.		MOD
	HW PUMP 3 - HP		MFG.		мор

			OPERATI	ON:					
HOURS ON:	s	м	Т	w	Т	F	S	COMMENT	
PRESENT START TIME	0	0	0	0	0	0	0	TIMECLOCK?	
PRESENT STOP TIME	2400	2400	2400	2400	2400	2400	2400	NO	
REQUIRED START TIME									
REQUIRED STOP TIME									
MONTHS ON:					L				
J F N	1 A	М	J	J	Α	S	0	N	D
1 1	1 0	0	0	0	0	0	1	1	1

	X	PNEUMATIC		ELECTRIC	ELEC'NIC	DDC	COMMENTS
ETPOINTS		PSIG	N/A	HW SUPPLY			
RESET CONTROL (oF):		HW HIGH		HW LOW	OA LOW	OA HIGH	
URNER CONTROLS		O2 TRIM (Y/N)		OTHER			